THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVIII. No. 2014.] LONDON, DECEMBER 17, 1901. [53RD YEAR. PRICE 6d.

PARKER & LESTER.

— *ESTABLISHED 1830* —

MANUFACTURERS AND CONTRACTORS, **ORMSIDE STREET, LONDON, S.E.**

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

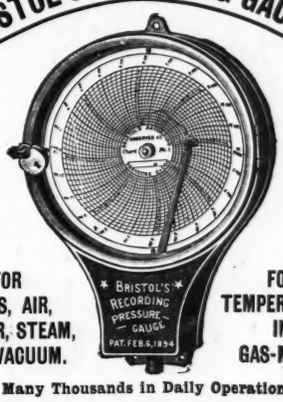
SAFETY GAS-MAIN STOPPER,

FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.

GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

BRISTOL'S RECORDING GAUGES



FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL,
LONDON, E.C.

Wrought-Iron

And Fittings & Accessories.

LAMBERT BROS., WALSALL,

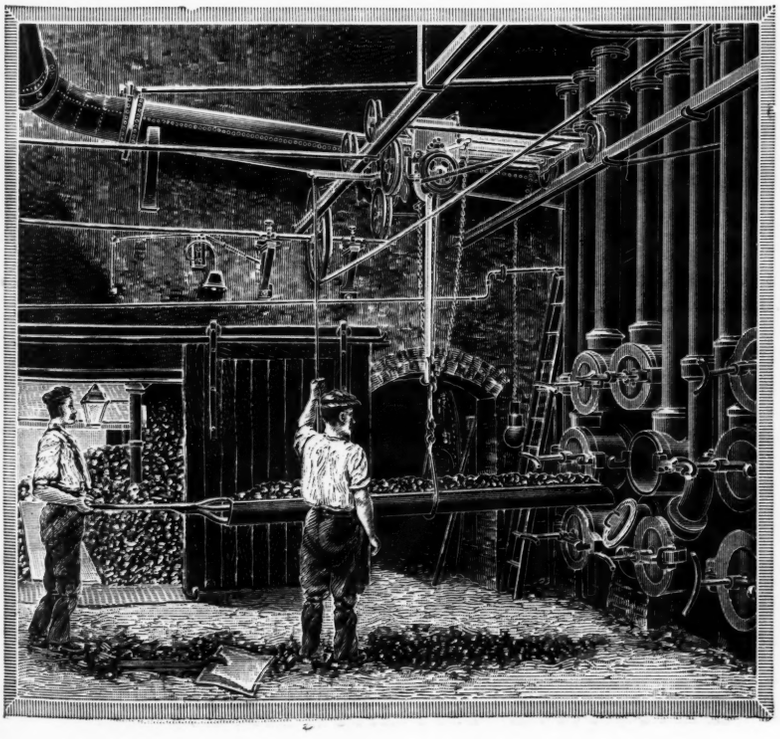
MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.

Horizontal Retort Charging Revolutionized



THE PATENT

"RAPID" POWER CHARGING APPARATUS

FOR GAS-WORKS.

Can be seen at work by appointment.

Biggs, Wall & Co.

13, CROSS STREET, FINSBURY,
LONDON, E.C.

TELEGRAPHIC ADDRESS:
"RAGOUT, LONDON."

WEST'S GAS IMPROVEMENT CO., LTD.,

ALBION IRON-WORKS, MILES PLATTING,

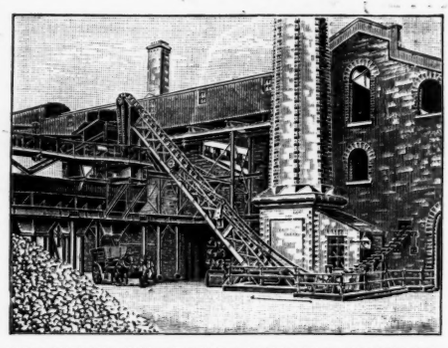
And 104, QUEEN VICTORIA STREET, LONDON, E.C. MANCHESTER.

SOLE MAKERS OF

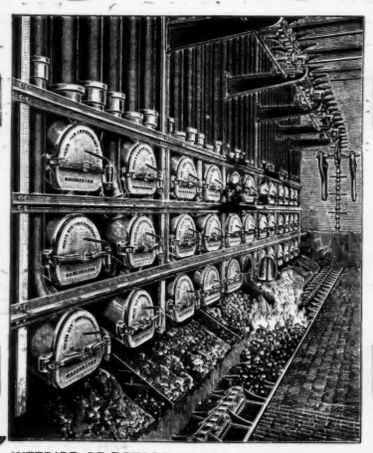
WEST'S STOKING MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.

ALSO

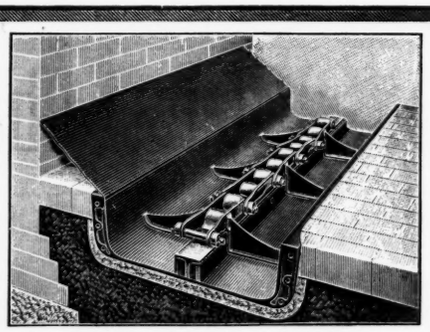
WEST'S PATENT SILENT COKE CONVEYOR



VIEW SHEWING END OF COKE CONVEYOR, ELEVATOR AND CONVEYOR FOR STORING COKE IN HOPPERS AND COKE YARD.



INTERIOR OF RETORT HOUSE SHEWING COKE CONVEYOR.



SECTION OF COKE CONVEYOR.

Silent in Action. Simple Wearing Parts. Does not make Breeze.

SPECIALLY ADAPTED FOR CONVEYING, ELEVATING, AND STACKING HOT COKE FROM GAS-RETORTS OR COKE-OVENS.

The Conveyor after leaving the Retort-House may be arranged to rise up an incline to any required height, and the Coke delivered from the Conveyor to the Coke-Store from any part of the Conveyor.

ALSO MAKERS OF

West's Coke Breaking, Sorting, Sizing, and Screening Machinery.
West's Patent Inclined and Horizontal Regenerator Settings.
Coal-Handling Machinery for Gas and Electric Light Works.

GAS AND GENERAL ENGINEERS.

THE BARROWFIELD IRON-WORKS, LIMITED,

Late LAIDLAW, SONS, & CAINE, Limited,

GAS ENGINEERS & CONTRACTORS,

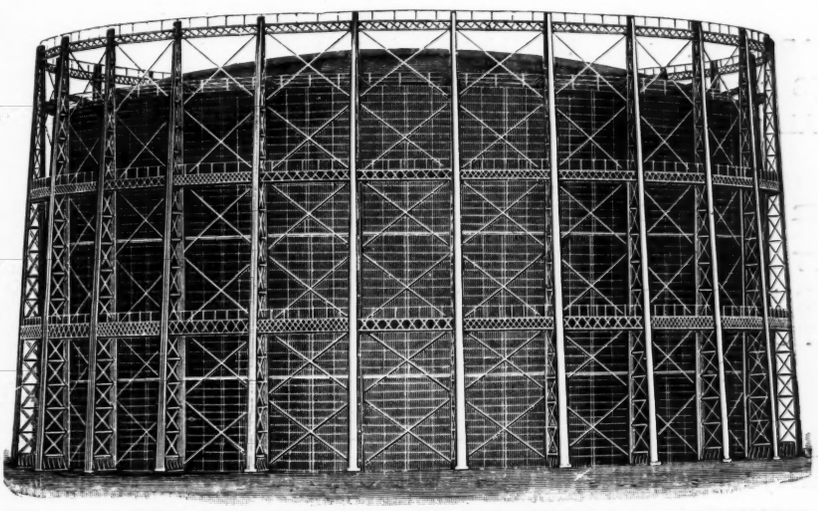
Telegrams: "GASOMETER GLASGOW." GLASGOW.

OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.



GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS AND FITTINGS.

THREE-LIFT GASHOLDER. Capacity, SIX MILLION cubic feet.
240 feet Diameter by 45 feet Deep each Lift. Erected at Glasgow, 1893.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

GEORGE ORME & CO. (Branch of Meters Ltd.)

Atlas Meter Works, PARK STREET, OLDHAM.

"NEW CENTURY" PATTERN

Patent Coin *Prepayment Gas-Meters*

Fitted with Detachable Attachments.

Arranged for 1d., 1s., or any other Coin desired.

Dry Meter in Tin-Plate Case, fitted with Attachment.

Price changed *in situ* by means of one Crown Wheel only.

COMPACT.

DURABLE.

RELIABLE.

SIMPLE.

Wet Mete in Cast-Iron Case, with Attachmen Removed.

Any further Particulars will be supplied upon Application.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: **19, Great George Street, WESTMINSTER.**

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Speciality.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS, AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its unrivalled excellence.

Telephone No.
756 BANK LONDON.

Telegraphic Address:
"ROBUSTNESS, LONDON."

ESTABLISHED 1873.

Contractors to H.M. Government.

RETORT-SETTINGS

INCLINED, REGENERATIVE, GENERATIVE, AND FLOOR LINE.

SEVERAL THOUSANDS OF OUR SETTINGS IN SUCCESSFUL WORK.

Plans, Estimates, and full Particulars for Complete or Partial Erection and Renewal.

J. & H. ROBUS,

Engineering Contractors for Gas and Water Works,

20, BUCKLERSBURY, LONDON, E.C.,

And GORING, OXFORDSHIRE.

GASHOLDER TANKS. RESERVOIRS.

MAIN LAYING. BORING. WELL SINKING.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

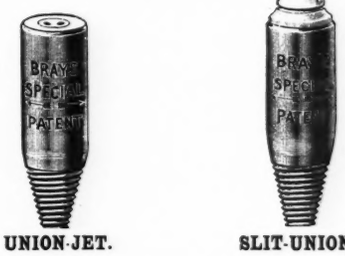
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY,

Gas Engineers and Contractors,
BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

BRAY'S "SPECIAL" GAS BURNERS.



UNION-JET. SLIT-UNION.

See that each Burner is stamped BRAY'S "SPECIAL" PATENT.

Show Cards fitted with Metal Clips for attaching BRAY'S "SPECIALS" thereto.

GEO. BRAY & CO., GAS LIGHTING ENGINEERS, **LEEDS.**

GIBBONS BROTHERS, LIMITED,

Telegraphic Address: "GIBBONS, DUDLEY."

DUDLEY,

Telephone: No. 8013.

GAS ENGINEERS, CONTRACTORS, RETORT SETTERS.

Patent REGENERATIVE SETTINGS,

GIBBONS & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT-BENCH IRONWORK, CONDENSERS, SCRUBBERS, PURIFIERS, VALVES, &c.

DESIGNS AND ESTIMATES ON APPLICATION.

WILLEY & CO., LONDON & EXETER.

ENGINEERS.

ORIGINATORS

OF

SLOT INSTALLATION SCHEMES

INCLUDING the METER and MAINTENANCE.

100,000 FIXED BY US THROUGHOUT THE COUNTRY.

GAS COMPANIES NEED DO NOTHING BUT COLLECT THE MONEY.

METROPOLITAN GAS METERS, Ltd.,

Manufacturers of Dry Gas Meters

(PREPAYMENT & ORDINARY.)

Distinctive Title

"THE"

Telegraphic Address:

"GASOMETER, LONDON."

Telephone Number 1259 Hop.

Offices and Show-Rooms:
62, Glengall Road,
Old Kent Road,
London, S.E.

Works:
62, Glengall Rd., Old Kent Rd.,
And Willowbrook Road,
Trafalgar Road, S.E.

Midland Counties Office:
Temple Court,
Temple Row,
Birmingham.
TELEPHONE 2746.

FOR

W. C. HOLMES & CO.'S EXHIBITS

AT THE

Crystal Palace Gas Exhibition

SEE

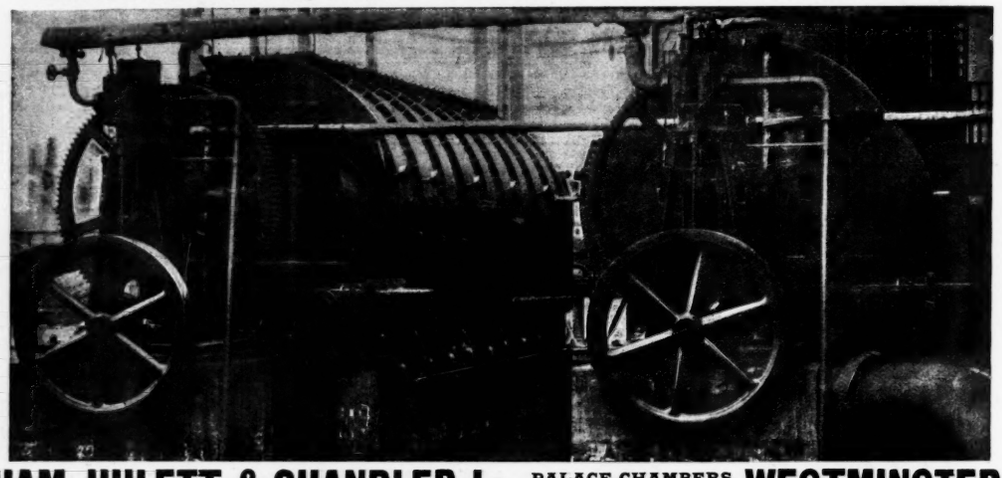
STAND No. 15.

Naphthalene extracted by the YOUNG & GLOVER PROCESS as applied to—

PATENT "STANDARD" WASHER-SCRUBBERS.

ALL the Ammonia and a large proportion of the CO_2 and H_2S also extracted by these Machines.

Prevention of Slip of Gas Unwashed.
Strength of Liquor Concentrated.



Maximum Washing Surface.
Easy access to Interior.

KIRKHAM, HULETT, & CHANDLER, LD., PALACE CHAMBERS, BRIDGE STREET, **WESTMINSTER, S.W.**

AGENTS for the YOUNG and GLOVER PROCESS.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "PARKER, LONDON."

THE
MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER 100 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Southport, Alloa, Broughty Ferry, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

A PLAIN TALE FROM "THE 'ILLS."

BY AN "'*ill*"-KNOWN AUTHOR.

There's no end o' ills as our pore flesh is heir to,
Sich as measles, the "blues," wooden legs, and red 'air, too,
An' others I ain't got no tyme ter refer to,
But though I'm a heir o' them ills, it ain't fair to
Grab more'n I needs!—so yer may have my share too!
Just tyke it, an' welcome—that is, if yer care to!

There's one "*Ill*" I 'ave, though—a Arden '*Ill* Cooker
Wuth *its* wyte in gold (w'ich some calls filthy lucre)
And don't go supposin' as 'ow I shall part with
A stove yer can byke such a stunnin' good tart with!

W'ich "Acme" its nyme is, an' Acme's 'it's natur'—
"Perfection" to cook either turkey or 'tatur.
My Betsy at 'ome—w'y, its like the theayter
Ter watch 'ow she lights the gas, then puts the pies in—
They're 'ardly well in till yer sees 'em a-risin',
Brownin' like beauties—an' so appetisin'!

In no tyme they're ready, with no mess nor 'urry,
No 'eat ter rowst *you*, nor no coal bill ter worry;
W'ile Betsy can keep 'erself smart-like and tidy,
Fyce with no smuts on, an' 'ands like a lydy.

None wot as a "Acme" 'll chynge for another.
W'en one chap axed me to, I ses, "Is yer mother
Awyre as ye're out? Do yer think I'm a soft un?"
Ses I, sidlin' up ter 'im, fierce-like. 'E coughed, an'
Slid orf;—an', If *I* knows, 'e won't come back orften!

This is my tyle o' the Arden 'Ill "Acme,"
"True?"—If it aint, may the guvenor sack me;
Thirst—an' no beer nigh ter quench it! —attack me;
Frost chill an' 'ack me;
Roomatiz rack me
With far worser pynes than a 'arf-inch tin tack may
Hinflict on the foot
O' the bloomin' galoot
Wot steps on it sudden, 'thout stockin' or boot!
Goodbye now. That's all; as the French ses, C'est *toot*.

For further Particulars (in prose!) apply to your local Gas Office, or to

Arden Hill & Co., Salford St., Birmingham.

Copies for distribution—exactly above size—free on application.

The LEEDS FIRECLAY CO., LD., WORTLEY LEEDS.

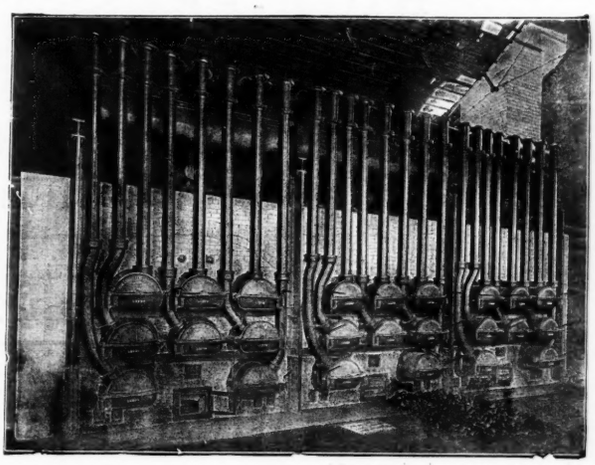
Telegrams: "SETTINGS, LEEDS." Telephone: No. 1332.

ENGINEERING DEPARTMENT

RETORT

INCLINED, HORIZONTAL, REGENERATOR, GENERATOR, AND DIRECT FIRED.

RETORTS RE-SET.



SETTINGS

SHALLOW REGENERATORS A SPECIALITY.

NUMEROUS TESTIMONIALS.

GUARANTEED RESULTS EXCEEDED IN MOST INSTANCES.

SOLE MAKERS OF HUDSON & RANN'S PATENT AUTOMATIC CHIMNEY DRAUGHT REGULATOR.

MOUTHPIECES, WITH SELF-SEALING OR LUTED LIDS.

BENCH, FURNACE, AND FLOOR IRONWORK ROOFS.

CONDENSERS, WASHERS, SCRUBBERS.

PURIFIERS, GASHOLDERS, &c.

COAL & COKE BREAKING, ELEVATING, & CONVEYING MACHINERY.

— *CONTRACTORS FOR COMPLETE GAS-WORKS.* —

BIGGS, WALL. & CO.

THE PATENT
"RAPID"
MANUAL
CHARGING
APPARATUS.

REPEAT ORDERS FOR MACHINES
At the following Places:

Two Machines
NEWPORT (MON.)

Two Machines
WORTHING.

Two Machines
ALDERSHOT.

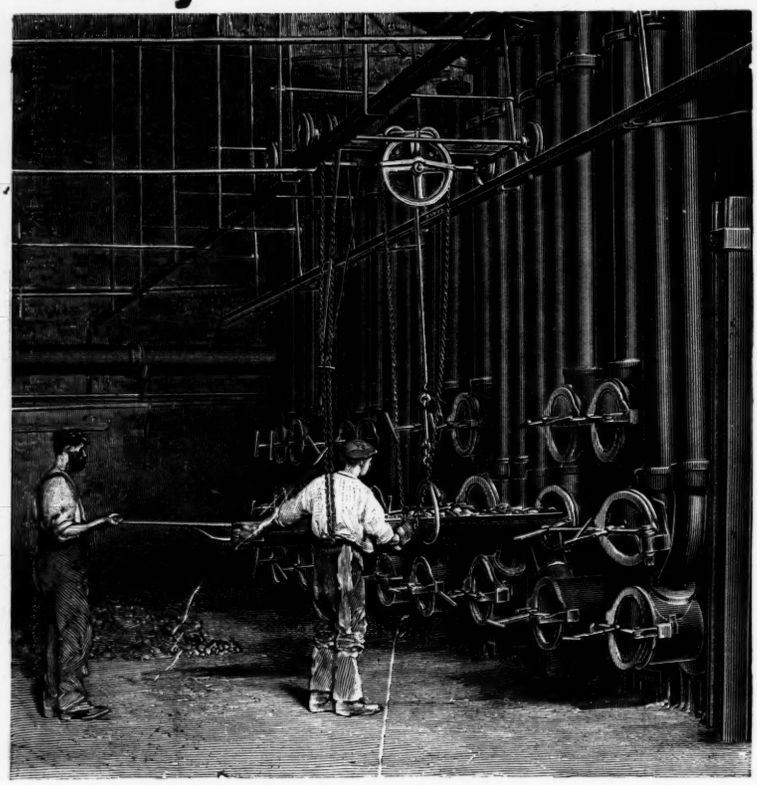
One Machine
YEOVIL.

MACHINES IN COURSE OF ERECTION

One Machine
BRITISH
GASLIGHT COY.

One Machine
SHERBORNE.

Two Machines
GOOLE.



4 CWT. CHARGE
TAKES LESS
THAN
ONE MINUTE.

Telegraphic Address:
'Ragout, London.'

13,
CROSS ST.,
FINSBURY,
LONDON,
E.C.

THIS MACHINE CAN BE SEEN AT WORTHING, NORMANTON, AND NEWPORT (MON.) GAS-WORKS.

SCOTT-SNELL SELF-INTENSIFYING LAMP.

Type of Ordinary Street-Lamp.

The ONLY
HIGH-PRESSURE LAMP.

300 to **500** Candles from a single Burner, with an efficiency of 35 Candles per cubic foot of Gas.

Automatic Action.
Self-Contained.

THE LIGHTING SUCCESS OF THE GLASGOW EXHIBITION, 1901.

NO Compressors, Special Gas Service, or TEARING UP OF ROADWAYS.

Lamps of all Patterns can be seen at Works:
29a, Gillingham Street (near Victoria Station).

THE SCOTT-SNELL SELF-INTENSIFYING GAS-LAMP COMPANY, LTD.,
53, VICTORIA ST., WESTMINSTER, S.W.

CONTENTS.

EDITORIAL NOTES.

GAS, LIGHTING, &c.—
The Crystal Palace Gas Exhibition . . 1581
The Right of Entry for Meter Inspection . . 1581
Result of a Poll in Birmingham 1581
Mr. Wordingham on Pipe Subways . . 1582
Is there a Crisis in British Industry? . . 1582
The Restriction of the Coal Output . . 1583
Electricians on the Burden of Bath . . 1583
WATER AFFAIRS—
Criticism of the Government Water Scheme 1584

ESSAYS AND REVIEWS.

The Engineer as Contractor 1585
Electric Lighting Memoranda 1586
The Vienna Municipal Gas-Works 1587
Gas and Water Stock Market 1589
An Irish View of Municipal Trading . . . 1590

NOTES.

Gas Explosions in Smiths' Bellows . . . 1591
Gas Lime as a Vermicide 1591
Solders and Soldering 1591
Water Supply from Driven Wells 1591

COMMUNICATED ARTICLES.

Gas Matters in the United States 1592
The Effect of the Coal Tax on Exports . . 1593

TECHNICAL RECORD.

American Gaslight Association 1594
Failure of an American Reservoir . . . 1595
Dempster and Broadhead's Coke Conveyor . 1596
Zimmer Conveyor at Bishop's Stortford . . 1597
Schofield's Diaphragms for Dry Gas-Meters 1598
The Inclined Retort and Coal and Coke Plant at Heckmondwike 1598
Open and Covered Service Reservoirs . . 1599

CORRESPONDENCE.

Carbonizing Wages at the Commercial Gas-Works 1604
The De Brouwer Coke-Conveyor at the Wakefield Gas-Works. 1604
The Cost of Carbonizing by Inclined Retorts 1604
Inclined *v.* Horizontal Retorts. 1604

REGISTER OF PATENTS.

Liquid Meter—Mills, B. J. B. (Duchamp, J. M., and Phillipe, R.) 1601
Heating Producer and Other Gases—Duff, E. J., and the United Alkali Company, Limited 1601
Machinery for Unloading, Heaping, Storing, Screening, and Loading Coke, Coal, and other Materials—Woodward, J. . . . 1601
Automatic Gas-Lighting Apparatus—Sefton-Jones, H. (Fader, C.) 1602
Incandescent Gas-Burners—Sugg, W. T. . 1603
Utilizing the Heat of Coke Removed from Retorts—Gobbe, E. 1603
Patent Notices 1603

LEGAL INTELLIGENCE.

Gas-Meter Inspectors and their Right of Entry 1604
Supply of Gas to a Club. 1604
Gas Company's Clerk Charged with Falsification 1604
Gas Company's Secretary Charged with Embezzlement 1604
Imprisonment for Stealing Gas 1605
Connecting Water-Pipes without Consent . 1605

MISCELLANEOUS NEWS.

The Gas Exhibition at the Crystal Palace . 1605
Carlisle Gas and Water Works Management 1609
Continental Union Gas Company, Limited—The Strike at the Italian Stations . . . 1609
Proposed Amalgamation of the Bournemouth and Poole Gas Companies 1611
Devonport Gas Arbitration 1612
Devonport Gas-Works Transfer 1615
The Gas-Stove Question at Morecambe . . 1616
Sowerby Bridge Gas Accounts — The Auditor's Report 1616
Serious Explosions in Gas-Works . . . 1616
Electric Lighting Notes 1617
The Metropolitan Water Question . . . 1618
Southwark and Vauxhall Water Company . 1619
Grand Junction Water-Works Company. . 1620
Rating of the East London Water Company 1621
Oldham Corporation Water Supply . . . 1623

MISCELLANEOUS NEWS (*continued*)—
Stock and Share List 1623
Notes from Scotland 1624
Current Sales of Gas Products 1625
Coal Trade Reports 1626

PARAGRAPHS.

Obituary and Personal 1590
Agricultural Value of Sulphate of Ammonia —"Premier" Gas-Engines for Mond Gas —A Power Gas from Petroleum—Exhibition of the Nernst Lamp in Birmingham. 1591
New Reservoir for Dewsbury 1603
Progress of the Spalding Gas-Works—Water-Works Purchase at Malmesbury . . . 1605
Strike at Merthyr Gas-Works—Omagh Gas-Works Purchase—Leeds Gas-Workers and Sunday Labour 1609
Further Extension of Incandescent Gas Lighting in the City—The Management of the Coventry Gas-Works—Shortage of Gas at Brighouse — Northampton Gas Company's Assessment Case 1611
Price of American Gas Coal 1615
The Morecambe Gas Manager's Claim—New Joint-Stock Companies 1616
New Gas-Works for Aberavon 1625
The Oldham Appointment—London County Council and the Transfer of Mains to Subways 1626
Bradford and the Charge for Water for Trade Purposes—Gas *v.* Electric Lighting in Salisbury—New Water-Works for Otley—Birmingham Corporation Bills—Sales of Stocks and Shares. 1627
St. Helens Water Supply—Blaina and Brynmawr in Darkness — Walsall Manufacturers and the Price of Gas—A Somersetshire Town in Darkness — New York Flooded—Huddersfield Corporation Bill—Entertainment to the Employees of the South African Lighting Association . . 1628
Proposed Amalgamation of Gas Companies —Secret Commissions in the Coal Trade —Gas Poisoning Fatalities 1629

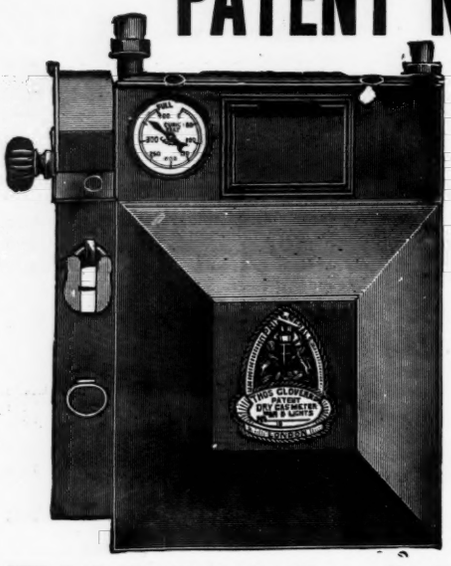
Messrs. HUMPHREYS & GLASGOW

CARBURETTED WATER-GAS PLANT.

38, VICTORIA STREET,
LONDON, S.W.
Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:
BANK OF COMMERCE BUILDING,
NEW YORK.

THOMAS GLOVER & CO.'S PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.
Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725 Holborn.

BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 1035.

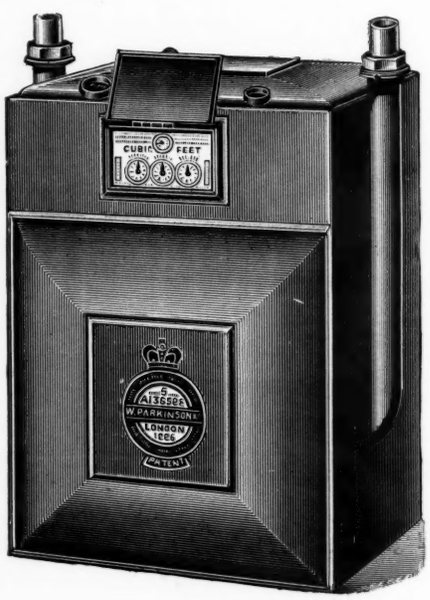
BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 3898.

GLASGOW: 69-71, McALPINE STREET. *Telegraphic Address: "GASMAIN."* Telephone No.: Argyle 1055.

PARKINSON AND W. & B. COWAN, LTD.
(PARKINSON BRANCH.)

WET & DRY GAS-METERS
OF
SUPERIOR QUALITY.



GUARANTEED FOR **5** YEARS.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegrams: "INDEX." Telephone No. 778 King's Cross.

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegrams: "GASMETERS." Telephone No. 1101.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXVIII., No. 2014.—TUESDAY, DECEMBER 17, 1901.

EDITORIAL NOTES.

The Crystal Palace Gas Exhibition.

A FEATURE of this issue of the "JOURNAL" is the account of the gas exhibition which is now running its course at the Crystal Palace, and which was opened last Saturday. We have dealt in that account as fully as circumstances and space will permit with what is to be seen at the exhibition, so that there is no necessity to comment at length upon it here. It was generally recognized by the gas engineers present on Saturday that, while the show is not a large one, it is excellent so far as it goes. And this is all that can be said. With them, we feel that it does not set before the public a complete picture of what the gas industry is; and in that respect it falls short of our estimation of what such an exhibition—especially to deserve the epithets of "great" and "international"—should be. What is required is a full exposition of the marvellous progress which has been made in both manufacture and methods, and of the many and varied processes involved in the production of gas and its bye-products—real object-lessons, taken *seriatim*, from the beginning to the end. It is no good, in a public building like the Palace, putting down, in piecemeal fashion, portions of gas apparatus. The public simply stare at them and wonder, and go away possessed of as much wisdom concerning their use and purpose as they had before they saw them. The exhibition proves that individual effort—no matter how good the personal energy may be—is a failure in securing a thoroughly good presentment of so large an industry as that in which we are interested; and therefore we sympathize with, and cordially support, the view expressed by Mr. W. R. Herring, at the inaugurating dinner held on Saturday evening, that gas engineers should "*as a body*," take an early opportunity of organizing an exhibition which will not only enlighten the public as to how to burn gas, but will interest them also in the methods, labour saving and otherwise, which have to be employed in its manufacture. We sincerely hope the suggestion will not be permitted to fall flat. At the dinner, Mr. Corbet Woodall was the chief guest; and he responded to the toast of "Con-" tinued prosperity to the gas industry." His speech, which carried those present back to the exhibition of 1883, and brought before them things as they then were and are now, forms interesting reading, as his public utterances always do. We need not say any more, but will leave the report published elsewhere to tell its own tale.

The Right of Entry for Meter Inspection.

ONE of those petty, but at the same times vexatious, points of law which are constantly cropping up as though to create friction in the working of popular institutions, has engaged the attention of the Judge of the Wakefield County Court. It took the form of an action for trespass upon a gas consumer's premises by one of the Wakefield Gas Company's collectors, who, in the temporary absence of all the occupants, lifted the latch of the street-door, went in, and took the money from the "slot" gas-meter. It was not disputed that this was done in pursuance of established custom, which agreed with the necessities of the Company's business, and gave no annoyance to that class of gas consumers which has the habit (general among the cottage population) of leaving the house-door on the latch during temporary absence. This particular customer objected to the collector's free-and-easy custom, and successfully invoked the majesty of the law for his protection. Result—one more legal ruling in the sense of "an Englishman's house is his castle;" coupled with a strong judicial hint to the nominal trespassers to have a clear agreement with their customers as to how the necessity for attending to their gas-meters is to be worked. Of course, the Court is quite right. All the same, the work of the world could not be carried on if everybody insisted upon his strict legal rights. We believe it is legal trespass to force a tramway ticket upon a passenger against his will. On the other hand, it is to be feared that the reasonable rights of the poor to their own privacy, and in other matters, are often over-ridden by bailiffs and other objectionable official persons; and gas companies would be well advised to keep their outdoor servants well within their indisputable rights. It is really a very serious and responsible matter, this statutory right which gas and other supply companies possess to enter, by their servants, the houses of all sorts and conditions of people. The dread of it keeps some householders from having anything to do with such companies; and this tenderness is entitled to every respect. The moral of the Wakefield incident should be taken serious notice of by all gas companies' officials.

Result of a Poll in Birmingham.

THE most unfortunate experience of the Corporation of Birmingham last week, when their "Omnibus" Bill was rejected on the poll of the ratepayers, will probably become the ground of a fresh attack upon the Borough Funds Act. The fate of the Bill was sealed by the vehement opposition of the inhabitants of the Edgbaston district to the tramways part of the measure; and accordingly the whole thing has gone—the proposed purchase of additional gas lands, and all the heavy sessional work of the Town Clerk's office. Such a "wicked waste" of endeavour, time, and money is sure to lend strength to the agitation against the Borough Funds Act which the Association of Municipal Corporations has been engineering for years. It will be necessary, however, to discriminate in this matter. In the first place, it will never do to abuse the Borough Funds Act because it has afforded the Birmingham ratepayers a suitable opportunity for upsetting a Corporation scheme of legislation. That is precisely what it is for. It is far too readily assumed by those who constitute the *imperium in imperio* of a municipal corporation, and also the newspaper advocates of Municipalism in everything, right or wrong, that what a local authority proposes is always best for the locality. If the modern craze for municipalizing everything does not imply this assumption, it has no sound basis. The British constitution, however, knows no such institution as an omnipotent local authority. Such bodies are statutory creations entrusted, for convenience and efficiency's sake, with the administration of the affairs of the community, just as a police constable is only a citizen chosen to do other citizens' parts as well as his own in keeping the King's peace. As a rule, and within the recognized limitations of their operation, local authorities are trusted by the public to do their work in the ordinary way. There are exceptional junctures, however, when the community resumes its original power to manage its own affairs by the immemorial agency of a town's meeting; and when this occurs, the local authority has, of course, to bow to the higher power.

The Borough Funds Act is an invention for securing the assent of the citizens to any proposal by their representatives in local government to alter the local laws by a Bill in Parliament. Whether it is quite the best arrangement that could be devised to attain this object, is a much-disputed question. Probably, the balance of instructed and impartial opinion would incline to the judgment that the machinery of the Act is imperfect and unsuitable to the circumstances of many communities to-day. It nevertheless is unmistakeably effective when it works as it did in Birmingham last Friday. The vote on this occasion condemned the Corporation Bill by 15,419 to 2097—a sweeping majority of 13,322. The number of burgesses voting was a little over 8 per cent., which is a fair poll as such polls go. The most significant feature of the vote was the smallness of the support commanded by the Corporation proposals. The reasons for this would be worth knowing. The unpopularity of the Bill was previously made manifest at the public meeting, when the voting against it was about three to one. It is reported that the declaration by the Lord Mayor of the result of the poll was received with cheers by the crowd in the Town Hall.

This being the state of the case, how is it to be accounted for? Some say that it was all on account of the provisions of the Bill having been rushed upon the people at the last moment, and that if the working-class voters in particular had known better what the Corporation designed on their behalf, they would have voted "in their thousands," and

carried the Bill easily. This is the old story. The working classes never will vote in full strength for what other persons think is best for them. If this abstention can be regarded as a reproof to class legislation, it is no bad thing. The editorial columns of the "Birmingham Daily Post" may be assumed, we suppose, to very fairly express the best public opinion respecting such important City matters as the provisions of a Corporation General Powers Bill. The activity of local patriotism, and the close grip maintained by Birmingham as a whole on its local administration, are a by-word throughout the country. Londoners, at any rate, are very often adjured to copy this brilliant example in local self-government. And this is how the model Municipality fares, in the sight of all men! The City Council produce a Bill which not fifteen hundred voters could be found in all Birmingham to endorse.

Something must be out of joint here. The "Post" says that this very Bill, which was so contemptuously rejected by the people, was approved almost unanimously by the Council. Probably the bulk of its 5000 lines would have been equally favoured outside; but there was a difficulty. Suspicion was created that the Town Hall was disposed to keep things back from the ratepayers. Here was a Bill in several parts, each of which must have been the special care of at least one Committee of the Council; and little or nothing was allowed to transpire concerning the nature of the business in hand. Even this, however, would not have really mattered, but for a particular bit of intelligence which did leak out, and was to the effect that power was to be sought to carry the Corporation tramways into the residential suburb of Edgbaston, which objected. This suggestion seems to have been made in the interest of the working men, who nevertheless would not take the trouble to vote for it, while the aggrieved suburban residents weighed in all their power and influence. The consideration arises whether these "Omnibus" Bills could not be submitted to ratepayers in parts; but there is more than one side to this question. Railway Companies' Bills, and others, have been thrown out of Parliament for containing some small matter to which strong opposition existed. Meanwhile, the faithful dealing of the ratepayers of Birmingham with their Corporation may be trusted not to escape general observation. How glad the Labour Bench of the London County Council must feel, to think that their tramway schemes for spoiling the Victoria Embankment and other London thoroughfares need not be submitted to any body of Metropolitan ratepayers!

Mr. Wordingham on Pipe-Subways.

THE report of the Tramways Superintendent and Electrical Engineer of the London County Council on shallow tramways-subways is criticized in a contemporary by Mr. C. H. Wordingham, upon lines very similar to our own. On the detail point of pipe-subways, Mr. Wordingham offers some observations which are worth recording for reference in future controversies. He, like ourselves, fails to see in tramways-subways a generally available cure for main-laying troubles; for tramways and pipes cannot be next door neighbours everywhere. He remarks that "the whole "question of subways for pipes is one which appears to have "received very little careful attention. It seems usually to "be assumed that they offered a complete remedy for the "trouble arising from the disturbance of the streets, and "that it is only a question of cost whether they shall be "constructed or not." This is true; and the reason is because it is chiefly the busybodies who make so much fuss on local authorities, who have the first say in the public ear in regard to all such matters. An individual may be totally incompetent to offer an opinion upon any technical matter; but let him get elected to a public body, and he will not experience the least bashfulness in brow-beating a Postmaster-General on the subject of telephones, or a gas company in regard to the possibility of their usefully occupying pipe-subways.

Suppose, for the sake of argument, that a subway were made, to contain a tramway and an assortment of gas and water mains and electric wires. What guarantee is there that the pipes and wires will not be as great an annoyance to the users of the subway for traffic as if these were laid in a roadway? If the mains and cables were all of a "trunk" order, of course, they would be unobjectionable. But then the advantage of having them in a subway is not at all obvious. If they are distributing mains and wires, however, to which service connections must be joined or cut off as the case may be, how will the tramway passengers like their company? How will gas, water, and electricity supply companies regard the risk of tapping their pipes and wires, with all this proposed traffic going on? There will be leakage—where is it to go? If the object of putting a pipe in a subway is not to facilitate access to it for the usual purposes at any time, what other benefit does a pipe owner derive from it? Hence, it appears that the entire question is of the class upon which the opinions of experts ought to be heard.

Is there a Crisis in British Industry?

DURING the last few weeks, a series of remarkable articles on "The Crisis in British Industry" has appeared in "The "Times," and has evoked a good deal of comment and correspondence. The alleged crisis is the imputed deliberate intention of Trade Unions to restrict the output of British workmen, by laying upon their members the injunction to "go slow," in order that the duffers may live as well as the smart hands, and that there may be enough work left to go round. We have not noticed these articles, although they referred to the origin of the South Metropolitan gas stokers' strike, and some other pieces of evidence that have been mentioned in these columns. In case "JOURNAL" readers may wonder at this apparent avoidance of the topic, we desire to explain that we are still waiting for the completion of the series of articles in question, and for the end of the incidental correspondence. We are waiting for facts, which are less plentiful and solid than might be wished in this connection. The exposure began with the definite accusation, levelled against Trade Union bricklayers—and especially those in the employ of the London County Council—that they do not do more than one-half the tale of work that was customary with their predecessors in the days before their Union Secretary became an Alderman of this puissant body. It was alleged that whereas the Council had endeavoured all along to be a model employer of labour, there is a lamentable lack of reciprocity on the part of the employees, who are far from acting as models of anything, except as practitioners of the art of spinning out a job to the uttermost. Of course, this accusation cuts very deeply into the Council's professed policy; and it is so far satisfactory to know that the Chairman has promised that the facts shall be thoroughly investigated and made known. These are among the facts we are waiting for. If any of our habitual readers, who may be able to exactly compare the normal working performances of several different classes of artisans now and twenty or thirty years back, would kindly look up the subject and acquaint us with the result, it would be a great assistance to the elucidation of a fiercely-debated point.

Honestly, we shall require irrefragable evidence to persuade us that a British workman of the present day is one whit a worse man than his forerunner of a past generation. Here and there, when he falls upon a soft job, or has to do with incapable masters, he will naturally "try it on;" but he is not singular in this weakness. As a Trade Unionist, or without this development, the hand-worker may break out against the employment of machines to take, as he thinks, the bread out of his mouth. Is he peculiar in this? Again, as a Trade Unionist, the workman may be a pitiable victim of the disease known as "swelled head," and require the application of a very drastic cure—such a one as Mr. Livesey has known how to administer. It is desirable in these studies to discriminate between the local and the temporary, and the general and characteristic. Now, it is unquestionably true that American critics of the British workman do accuse him of being a sluggish, uninterested worker, and allege that we, as a nation, are all too fond of holiday-making. They say that our traditional and bank holidays are too lingering. It takes us a week or more to get over Christmas or the New Year, Easter or Whitsuntide, and several days to get into the swing again even after an ordinary day off. Americans say that the fear of doing too much is continually weighing down the British worker; whereas on their side the greater the amount of the output that a man with a machine can show, the better the man is pleased. They roundly accuse the Briton, in brief, of having lost the habit of putting his heart into his work, and doing it with all his might.

Of course, if this is so, then the English people are going downhill. The man who works with all his might works better than he knows. England has far outstripped other nationalities of the Eastern Hemisphere, merely because the people, as a rule, have more grit, whether for working, or

playing, or fighting, whichever may be the business in hand. A man cannot be false to himself in one respect without becoming weak in all. If Trade Unionism, or Socialism, or Anarchism, or Atheism, or whatever the influence, has actually eaten into English manhood so that it is deliberately false to its plain duty, then the canker must either be cut out or the patient will die. Everybody knows that there have been numerous instances of foolish men falling out with their bread-and-butter at the instigation of designing agitators who meant nothing less than to share their sufferings. Just in the same way, there are, among certain races, types who will sooner waste their days in cultivating rancorous politics than buckle to and work. It takes all sorts of people to make a world; but we should like, before accepting it, to make sure of the truth of the allegation that the British workman, take him all round, is the bad bargain he is sometimes imputed to be.

The Restriction of the Coal Output.

THE whole question of the wisdom of the policy adopted so widely by Trade Unionists, of restricting the productiveness of the individual, with the double object of keeping up the price of the article produced and of "making the work go "round," is prominently before the public just at present; and the discussion thereon will be still further dealt with in the "JOURNAL" in due time. A particular example of the general practice—and one that has close connection with the gas industry—calls, however, for separate notice. We refer to the limitation of output being now so freely indulged in by the coal miners. This practice is being adopted, though in a less conspicuous manner, in other quarters than the South Wales coalfields, where the situation created by the "stop-day" policy of the Federation remains unchanged, and the greatest unrest and uncertainty exist. In Scotland, the miners are (doubtless in accordance with a deliberate, though not declared, policy) working very "easily," in view of a prospective discussion with the owners as to wage rates. In Durham, the idleness of the men has reached such a pitch that the masters have laid a complaint on the subject before the Miners' Association.

The owners, at a recent joint conference with the men's executive, stated that, in the first ten-and-a-half months of this year, unauthorized stoppages of work, mainly on frivolous grounds or on none whatever, had taken place to the extent of 62,266 shifts, involving a loss to the men of £15,500 in wages. Apart from, and in addition to, these stoppages, the men had individually lost time in a constantly increasing measure. The figures given are striking, and show very clearly how higher wages and brisker trade lead to increased idling on the part of the men. The percentages of lost time are stated to have been between 7 and 8 in 1895-7, 8·4 in 1898, 9·4 in 1899, 11·1 in 1900, and 11·6 in 1901. Moreover, the fortnightly pay-days this year show that the increase is still maintained; the last two pays showing 12·5 and 13·5 per cent. of lost time respectively, or twice as great a loss of work and output as in the three years prior to the revival of trade.

It is but fair to the Durham Miners' Association to say that this increase of idleness appears to have had its origin among the men themselves, and not to have been advised by the Union authorities, who have issued a circular warning the men that the good times and high wages are certain to give way to a period of depression, and also chiding them for wasting their time and neglecting present opportunities of laying money aside against the rainy days to come. This is a pleasant contrast with the utterances of the South Wales Federation gentry, who look upon the wasting of time and money as a good stroke of clever tactics. But it is evident that the stupid idea that reducing output increases earnings has a wide and deep hold in the minds of the miners in this country. That a policy of creating an artificial scarcity of an article of general industrial consumption, not only does not ultimately benefit anyone, but actually in the end injures all parties concerned, is a truth that it is to be wished might be learned by the men's leaders, and instilled by them into the minds of their followers. But there is scant hope of that. The only spur that will urge the men to do a fair day's work will be the reduction of wages to such a level as to make it a matter of necessity that more than half-a-week should be spent in steady toil; so that for some time to come the output of coal is likely to be restricted. We do not anticipate any increase this year over last year's total production, in spite of the opening of more seams and the employment of more men. Rather is a reduction to be looked for.

How materially this slack working increases the cost per ton of getting coal to the waggon is shown by some figures given in the "Iron and Coal Trades Review" for the 13th inst. The total cost of producing coal in North Staffordshire in normal times is stated to be a fraction over 6s. per ton, of which 3s. 5d. goes in management, rent, royalties, wages other than that of the miners, and other fixed charges. A reduction of the output of a colliery by irregular working to two-thirds of the normal, increases those fixed charges to 5s. 1d. per ton. Moreover, as the whole of the slack and about one-half of the round coal produced is usually sold under contract, the owners of a colliery where such a reduction took place would have to obtain between 4s. and 5s. more per ton for the unsold output of coal to compensate them for the loss of output. No wonder that when the men are working "easily" the collieries are more anxious to sell in the open market than to deliver coal under contract at (as at present) about 3s. 6d. per ton below the current quotations. Several gas managers, unless we are misinformed, have recently found it necessary to remind contractors of their obligations; and, with the Durham men working as badly as the figures we have quoted show them to have been doing, the explanation is not far to seek. There is, however, no present shortage of coal; and before long there is likely to be a surplus. We are glad to see that the North-Eastern Railway Directors have declined to pay the high, and, as they say, "ridiculous," prices asked by the collieries. If sellers will not be reasonable, buyers can afford to wait.

Electricians on the Burden of Bath.

IT is always gratifying to us to be able to agree with our leading electrical contemporaries, and we are particularly pleased just at present to be able to shake hands with the "Electrician" over the electric light situation in Bath. This is so serious, that some periodicals which have been clamorous for references to places where municipal electric lighting has not proved altogether profitable or satisfactory, have not been able to take any notice of it as yet. It is not, however, like the "Electrician" to avoid a difficulty; and accordingly the current issue deals very fairly and candidly with what has already transpired of the "Burden of Bath." But we must enter a protest against the assertion made by the "Electrician" that our comments upon this deplorable business were either "jubilant" or "prophetic." There is not one word of jubilation in all these comments, nor is there going to be; for the disappointment of innocent ratepayers who have lost money, and a useful service into the bargain, is nothing to rejoice over. As to our waxing "prophetic," the reproach comes with a bad grace from those who have never done anything else than proclaim their reversionary rights to the lighting of the future. As a matter of fact, this reproof is not better founded than the other. If it is prophesying to see in the example of Bath a "beginning of the end" which awaits many other weak electricity supply undertakings in the United Kingdom, then we plead guilty to the impeachment. But it is news to us that to express a reasonable expectation of the consequences of admitted conditions is to "prophesy."

Let us pass on, however, from these verbal questions to the substantial admission of accord with our interpretation of this sign of the times which our contemporary proceeds to place upon record. It may not see in the example of Bath a beginning of the end; but nevertheless it does perceive here "a salutary warning to the responsible promoters "of municipal commercial undertakings." This is, obviously, a totally different thing. It is further remarked that "the "essential principles of finance are as inexorable in their "effect upon municipal trading as they are upon company "enterprise, though in the former their ill-effects may be "artificially staved off for a time—at compound interest— "by heavy inroads upon the rates. The sins of the unscru- "pulous company promoter may be closely imitated by the "extravagant municipal committee; and they are as surely "visited upon posterity to the third and fourth generations." After this, may we ask for a name or two?

The difficulty is, as many have found in the past, that it is impossible to expose in public the folly and deception that have usually gone to the embarkation of ratepayers' money on town "improvements," without being in danger of the law of libel. Generalities are futile. We have been constrained to deal at arm's length with these municipal delusions as

they have come before us, with the result that the eminent consultants engaged have almost invariably brought off their coveted jobs. Local authorities seem to be impervious to the teachings of general experience. It is for this reason that a concrete example, like that of Bath, is so valuable. The pity is that it has been so long in coming as to have almost lost its best value as a warning. Electricians, to do them justice, have done their best to improve the shining hour. They pestered local authorities into applying for Provisional Orders, and then worried them into carrying these permits into execution. They would not let Little Peddlington wait and see how Great Bunkham fared. They were wise.

For those local authorities—and they are numerous—who have not yet made the plunge, the "Electrician's" advice to take warning by Bath is excellent. The others, unfortunately, must abide by their fate. There is perhaps for them, in the charitable thought of the "Electrician," a means of deliverance from the uttermost condemnation. It lies in the possibility that "the honest financier"—what a curious combination!—will find it well worth his while to "be around" on that day "when mismanaged municipal "undertakings will be forced upon the market." Alas! poor Bumble—has it come to this already; that men should thus talk of the day when thy "remunerative undertakings," no longer remunerative, will be sold to the highest bidder? In that hour, those deceivers who have been instrumental in setting the trap of municipal trading for profits, will desire to conceal themselves in the sewers, in order to escape being strung up to the nearest ex-municipal electric lamp-post. Those big arc lamp-standards have a horridly suggestive aspect!

The Council of the Royal Meteorological Society, at their last monthly meeting, designated Dr. Alexander Buchan, F.R.S., as the first recipient of the Symons gold medal, in recognition of the valuable work which he has done in connection with meteorological science. This medal, which is to be presented biennially, was founded in memory of the late Mr. G. J. Symons, F.R.S., the distinguished meteorologist and originator of the British Rainfall Organization.

The funeral of the late Mr. William Carr, whose death on the 7th inst. was recorded in the "JOURNAL" last Tuesday, took place on that day at the crematorium at Didsbury, Manchester, in accordance with the wishes of the deceased. Among those present, in addition to Mr. Carr's son and brother (Mr. Harry and Mr. Isaac Carr), were the President (Mr. Charles Wood) and the President-Elect (Mr. A. Graham) of the Manchester District Institution of Gas Engineers, several members of the Institution, and the Mayor and Town Clerk of Stalybridge. The Chairman of the Gas Committee (Alderman Ridyard) and other members of the Corporation were detained in the town, owing to the accident at the gas-works, of which particulars are given elsewhere.

At the Forty-eighth Annual General Meeting of the Society of Engineers, which was held on Monday last week, Mr. Percy Griffith, Assoc.M.Inst.C.E., was elected President for next year. The retiring President (Mr. Charles Mason), in his valedictory remarks, mentioned some of the salient points of the work of the Society during the past twelve months; commenting on the papers which had been read. Among the premiums announced as having been awarded by the Council, was one to Mr. Arthur T. Allen for his contribution on "Concrete Subways for Underground Pipes," and another to Mr. Sydney A. Hollis for his paper on "Preliminary Investigations for Water Supply." The President also referred to the interesting visit the members paid in July to the Staines reservoirs works.

The "Engineer" says: In accordance with a request by the President of the Labour Commission of the French Chamber, that the Comité Central des Houillères de France would communicate any observations they might have to make with reference to the proposition for an eight-hour day in mines, M. Darcy, the President, and M. Gruner, the General Secretary of that body, with eighteen delegates, all chairmen, general managers, or chief engineers representing collieries in the various basins, set forth as follows the disastrous consequences that would follow an intervention forbidding the men to furnish more than 5½ or 6 hours' work: (1) Restriction of output through reduction of working hours; (2) reduction of wages or increase of cost, with further restriction of output through the incursion of foreign coals, which would oust the native coal and eventually close French collieries, thus (3) throwing a great many miners out of work, and (4) increasing the price of coal, together with that of manufactured articles and the cost of living. They urged that this measure, proposed in the interest of labour, would have the effect of either reducing wages or of diminishing the number of hands employed, with the obligation of all the workers to bear the cost of a privilege granted to a portion of them. Owing probably to the cogency of these arguments, the Minister of Public Works has communicated to the proper parties the fact that the Government would not support the measure.

WATER AFFAIRS.

Criticism of the Government Water Scheme.

THE London Water Question was so much in evidence last week, that it once more calls for notice. On Monday night, the President of the Local Government Board was the guest of the London County Council at the Hôtel Métropole; and his acceptance of the invitation to be present naturally led to the expectation that some pronouncement would be made, among other things, on the subject of water supply, in view of the recent publication of the notice for the Government Bill dealing with it. But, beyond the merest incidental references, it was conspicuous by its absence from Mr. Long's speech in responding, for the House of Commons, to the toast of "The Houses of Parliament." His remarks, in fact, took the form of a justification of the attitude of his Department and of Parliament towards some of the ambitious schemes of the Council. It was just as well to remind them, as he did, that Parliament must have supreme power to confirm or reject their suggestions, as they are apt to lose sight of this very obvious principle. St. Stephen's must guide Spring Gardens, or there will be no telling where we shall get to. At the same time, as he pointed out, there need not be hostility between the two bodies—each, it may be assumed, being actuated by a desire for the general good of the community. These observations were apposite enough; but they were not quite on the anticipated lines. This was evident from the opening sentences of Lord Rosebery's speech in proposing the toast of the evening. His Lordship confessed to a feeling of disappointment that Mr. Long had not favoured the company with "an exhaustive and statis-"tical examination of the London Water Question." However, it is not improbable that he consoled himself with the reflection that if that question had been dealt with in anything approaching an exhaustive manner, it would have stood in the way of the delivery of his own address. So the company separated without learning very much from Mr. Long about water supply. At the meeting of the Council on the following day, the Parliamentary Committee presented a report containing a few dubious remarks on the proposed Government Bill, but some more definite statements in regard to their own, and concluding by a recommendation that the latter should be proceeded with. This was agreed to, though not without protest from a member against further waste of the ratepayers' money.

The Council's Bill is now, therefore, fairly started upon its career, which, having regard to the opposition it will necessarily encounter from the Government and the Water Companies, will in all probability be a chequered one. But what, it may here be asked, is likely to be the fate of its competitor? Bearing in mind the statements made from time to time by the President of the Local Government Board, the Companies were certainly justified in expecting at his hands a measure which would embody the principal recommendations of the last Royal Commission. Unfortunately, the Bill of which notice has been given will fall lamentably short of this. True, it will follow the recommendations in providing for the formation of a Water Board; but in several other important respects it will depart from them. The interval which has elapsed since the publication of the notice has afforded an opportunity for its careful perusal by the parties principally concerned; and the holding last week of the half-yearly meetings of two of the Companies allowed of public expression of their views thereon. It will be seen, by the reports which appear elsewhere, that they are distinctly antagonistic to the Government scheme. Addressing the shareholders of the Southwark and Vauxhall Company on Tuesday, Sir Henry E. Knight spoke strongly against the constitution of the proposed Board, which would, he said, produce a "fluctuating representative body, ignorant "of the subject," instead of a group of men "selected on "account of their business capacity, and, if possible, con-"nected with water supply," as was suggested by the Royal Commission.

But the portion of the notice which evoked the strongest condemnation, both from Sir Henry Knight on Tuesday and from Mr. Tendron, who presided at the meeting of the Grand Junction Company the next day, was one which arrested our attention on reading it. It is the provision that the Water Board are to be at liberty to enter into possession of any of the Companies' undertakings on a day to be appointed, "before the ascertainment of the considera-"tion money." The real meaning of this provision is that,

before any arbitration takes place, the Companies may be deprived of their property, books, offices, and money, and, so to speak, be turned into the street without the wherewithal to defend their interests before the arbitrators when they are nominated. No such treatment of the Companies ever entered the mind of the Royal Commission. In fact, as Mr. Tendron said, such a thing had never been heard of until the idea was enunciated by the County Council. Again, with regard to the terms of purchase, the Commissioners say distinctly that, in the event of arbitration, the undertakings are to be acquired "on the terms usual "in cases of compulsory purchase;" whereas in the notice it is equally distinctly specified, as we pointed out when it appeared, that no allowance is to be made for compulsory sale. Mr. Tendron protested strongly against any alteration of the law on which property has been bought and sold for many years. The excuse for suggesting such a change is that the Companies represent so large a sum—£40,000,000 or £50,000,000. But, with Mr. Tendron, we question if this is a valid reason for bringing forward something totally exceptional, committing an injustice, and violating the law. He denounced the Bill in the most forcible language, and declared that the Companies would fight it to the utmost of their power.

When the President of the Local Government Board announced his intention of taking up the Metropolitan Water Question with a view to its settlement, it was predicted that he would find the task a very difficult one. Where other statesmen had failed, it was thought that he was not very likely to succeed. He, however, had full confidence in his powers. When addressing the House of Commons on the occasion of the rejection of the Bill of the County Council last March, he said that a measure "dealing, generally "speaking, with the recommendations of the Royal Com- "mission," and embodying a scheme of purchase "just to "those who were to be bought out and to the purchasers," could not be unduly delayed; and he added that he was sanguine enough to hope that the measure he was then preparing would settle a question which had troubled London, and also the House, far too long. He promised that no effort would be spared on his part to so frame the Bill that it should deal in a final and effectual manner with the London Water Question. What has been the result of his labours? A measure which, judging by the indication that has been given of its principal provisions, will meet with such opposition—from the Water Companies not less than their antagonists—that the end of next session may possibly see the "final and effectual" settlement of this troublesome question as far off as ever. Notwithstanding the adverse criticism it has received, however, Mr. Long is sanguine about the success of his Bill. At a smoking "At Home" given by Mr. J. Bailey, M.P., at the Hôtel Métropole, last Friday evening, in connection with the meeting of the Metropolitan Division of the National Union of Conservative and Constitutional Associations, he was much less reticent on the subject—owing, possibly, to the *sans gêne* character of the function—than he was in the same building earlier in the week. It will be seen from the report of his remarks which is given elsewhere that he augurs very good results from the introduction of his measure; and he justifies this optimism by the reception which his proposals have met, so far as they have been known. Mr. Long gathers from what has been said that this knowledge is not very accurate. The opinions expressed upon the proposed Bill have necessarily been based solely on the notice, which may turn out to be a not absolutely exact indication of the Government's intentions. The Bill may not, after all, be "a measure of confiscation," or create a Trust "worthy of "the worst days of Tammany Hall," as has been suggested, but one which, in Mr. Long's words, will "hit the happy "medium," and do justice between sellers and buyers. Let us hope this may be so; but if it should turn out to be strictly on the lines of the published notice, he may accept Mr. Tendron's assurance that it will be most strenuously opposed by the Water Companies.

The Franklin Institute have awarded the Elliott Cresson Medal to Herr Rudolf Diesel, of Munich, for the improvements effected by him in internal combustion engines, and for his practical application in actual work of the fundamental principles of thermo-dynamics. The merits of Herr Diesel's motor were investigated by the Committee on Science and the Arts, whose opinions are recorded in a report which appears in the current number of the "Journal" of the Institute.

ESSAYS AND REVIEWS.

THE ENGINEER AS CONTRACTOR.

ATTENTION has deservedly been given, in the "JOURNAL" (*ante*, p. 1226) and elsewhere, to the intensely practical and highly instructive address recently delivered by Sir John Jackson on "Engineering from the Contractor's Point of View." By one of those coincidences which are so frequently occurring that they sometime strike one as Dame Nature's kindly way of emphasizing a lesson which it is particularly desirable that her heedless children should learn, the same topic has just been treated for an American audience by Mr. George E. Gifford. It will be of advantage to collate him with his English compeer. Both speakers belong to the order of engineers from whom very little is usually heard in this way. For one thing, an engineer whose chief occupation lies in carrying out other men's plans, has little temptation to talk. He is usually not a frequenter of institutions and places where they discuss the design of works. Also, his engrossing solicitude it is, as Mr. Gifford says, to make cost keep within estimate, and have a little in hand. Consequently, his problems more often involve sums of money than stresses and strains; and his theses more frequently take the form of short, vigorous oral adjurations and directions addressed to his men than of literary compositions. Hard things are sometimes said of the contractors' engineer by his brother of the consultative branch; and the compliment might not infrequently be returned. The consultant blames the contractor's staff for sticking on costs; while the erector can usually inform his intimates in confidence, that if he had his own way, the work need not cost anything like the figure it attains in the hands of the consultant.

At the present day, as for some years past, engineers in the employment of contractors are taken from precisely the same class of young men as those who are employed in consulting engineers' offices. Whatever may be the case of contractors, some of whom would certainly only be spoilt by artificial education, no consulting engineer's training can be regarded as complete, unless he has at some time or other had a contractor's experience. He must know of his own knowledge what it is to carry out works as well as to plan them. Thus the great difference between the consulting engineer and the contracting engineer is the point of view. With the latter, considerations of cost are first and last in his way of regarding an engineer's work. His technical training may enable him to size up a job more rapidly than a less skilled man; but the fixing of prices must after all be a matter of experience and common sense.

Familiarity with the cost of previous jobs of the same kind enters more into the estimating labours of tenderers for a contract than the mere office-trained engineering assistant dreams of. It is to be gathered from Mr. Gifford's observations that the supply of quantities is not so general a practice in American civil engineering as it is in England, which is rather a sign of backwardness. It is very remarkable, however, that the amounts of tenders vary quite as widely where quantities are supplied as where would-be tenderers are left to take them out for themselves. Incidentally, also, Mr. Gifford discloses the interesting fact that consulting engineers in America are growing more particular in designing and specifying their own work. Formerly, it is understood, that when a railway company in the United States wanted a bridge, or a gas company wanted a gasholder, they merely asked for designs and prices from people in the business of making such things. Thus it came about that the bridge-building companies early standardized their patterns and scantlings, and so on. Certain people in England thought this a cheap and quick way of going to work in engineering construction; but it now transpires that the old-fashioned English practice of designing and specifying work to be let is coming more and more into fashion. Provided that the designer knows what is best for his particular job, it is evidently an economy that he should state the requirements, instead of encouraging every contractor to make his own designs. The latter was a provisional course which has now been largely abandoned. "To-day the people who follow this custom are likely to get scant attention; for the contractor can figure on plenty of work requiring far less trouble and time."

Besides, contractors get tired of doing consultants' work for them gratis; and the experience of seeing a trade rival's tender accepted for a job which you have had specially designed in your own office, is not a pleasant one. It has fallen to the lot of most contractors who offer to supply plans as well as estimates for carrying out work. There is no reason why this should not be done, outside the dictates of a sense of honour which not every consulting engineer possesses. It is consequently idle to complain of his conduct in this regard. The occasion for these performances crops up every time a structural novelty, or a speciality in some kind of plant, comes into the market. It may be carburetted water gas, or something in gasholder framing, or a retort setting. As soon as there is an effective, but limited, competition for the supply of these things, the trade is likely to be played off against itself. Usually, of course, this is done, not by consultants of the best class, who are mostly strong enough to make their own selection, and far-sighted enough to get it carried out on the best procurable terms. It is a trick of an inferior brand of professional, who thinks it smart to get information from one firm,

and engage another (who did not have to obtain it in the first place) to work in accordance therewith. Such shrewdness in business as this does not as a rule carry a man very far towards the headship of his order. It is irksome enough to the contracting engineer when three or four firms are invited to send plans and estimates for a job, thus involving the waste of all the money spent and pains taken, with one exception. As Mr. Gifford puts it, however, "This is not so bad as to find that your design is better than the other fellow's, but your bid higher, in which case the other fellow gets the contract on your design, and the purchaser gets the benefit of your engineering ability." There have been flagrant cases of this kind of misdemeanor in the United Kingdom, but rarely of quite so bold a pattern as one recounted by the author. An engineering firm had sent one of their staff to obtain the necessary data for designing some heavy structural ironwork for a prospective customer, by request. Plans and estimates were duly submitted, and the business was supposed to be in train. One day a blue print of some work was seen at the office of a rival firm which had a strangely familiar look; and upon investigation, it proved to be a reproduction of the original design, which had been sent out with a request for a tender.

The matter of pricing-out for a job is one for the judgment of the engineer, who has to determine what it will probably cost him to do it, and how much margin he can allow and yet not be above the other tenderers. "It is a very narrow road he has to travel, and one where a miss-step may mean a great deal. Here is where experience comes in—experience aided by good judgment, and both by an engineering training. The contractor must know what similar work has cost in the past; what the market value of the various materials entering into the construction is, and what it is likely to be when he is ready to buy them; the cost of transportation of the materials; the facilities for hauling, unloading, storing, and handling; what special machinery or appliances can be used to facilitate or cheapen his work; what they will cost, and whether it will pay to use them; what special risks will be incurred by the work under consideration, and what it is worth to provide or insure against them. He ought to know almost everything." Here the observation may be permitted, that a practical knowledge of how work is carried out is of enormous assistance to the engineer who is called upon to design it, in helping him to determine the location and appreciate the effect of the surroundings of a job. Text-books cannot prompt the designer to see that he leaves plenty of room for the working of gantries, sheerlegs, and for all the innumerable accessories that constitute contractors' plant. These are among the first things that a prospective contractor looks out for.

As Mr. Gifford remarks, the public and the technical journals usually take the execution of works for granted. The interesting thing is the design; and the ability of the engineer is rightly applauded. "But many times there is not a tenth part the common sense or ability required to design a thing that there is to successfully build it and make money out of it." Not "what to do," but "how to do it," is the contractor's problem. It is the contractor upon whom falls all the anxiety in regard to flood and fire, accident, and wilful damage; and, in addition to all this, he has to bear the worry of the labour question. There is a measure of consolation for Englishmen in learning, on the unimpeachable authority of Mr. Gifford, that in the United States the uncertainty about labour outweighs all other risks of the contractors' trade put together. Careful attention to details, and study of the site, will arm the contractor against a large proportion of the risk from the elements, or from accident; and insurance is open to him against other risks. He is defenceless, however, against loss by carelessness and negligence of employees, and from strikes. This is the kind of thing he has to put up with. "For a bridge erection job in the South recently, a gang of men were engaged in New York, and their transportation paid to the work. They were satisfied with their pay, and the work progressed satistactorily until a disagreement arose in New York between the Labour Union and the employees of the erection force. Upon receipt of a telegram from the Union, the gang stopped work one afternoon with all but two panels of a 250-foot railroad span erected; and the iron was left for some days on false work over a treacherous mountain stream until new men could be found and sent to the work. Although none of the work was damaged, the delay and extra expense incurred made the erection job a losing one, instead of showing a profit."

Lastly, Mr. Gifford declares that there are lots of chances taken in contract work. Of the nine which turn out all right you never hear anything; of the one which brings disaster, physical or financial, you are more likely to know, and say "how foolish." Yet it is often the acceptance of the chance that decides in favour of profit, instead of loss. "There is no field which offers better opportunities to the man with technical education, brains, and adaptability for it, than that of general contracting, and none offers so great a chance for the combination of education and business capacity." Mr. Gifford bids young engineers mark the increase during recent years of large contracting firms composed wholly or in part of engineers; and the substance of his advice to smart young members of the profession is that, instead of vegetating in underpaid official positions, they should turn their knowledge and ability to account by taking engineering contracts.

The death is announced of Mr. Henry Johnson, a well-known resident at Barnsley, and a Director of the Gas Company.

ELECTRIC LIGHTING MEMORANDA.

The Award as to the Electrification of the London Underground Railways—Superior Attraction of Electric Traction to Electric Lighting—Electrolysis to be Expected—The Hon. A. Lyttelton's Report.

THE award of the Court of Arbitration on the question of the system of electrification to be applied to the Inner Circle lines of the Metropolitan and the Metropolitan District Railways has been published. It is a very business-like pronouncement, deciding unreservedly in favour of the tried and well-known "continuous" system of electric traction, and against the high-pressure "alternating" system proposed by Messrs. Ganz and Co., of Buda-Pesth. The award has received the assent of the Board of Trade, and has been accepted as conclusive by the Boards of the two Railway Companies. It has already been reported that the first steps have been taken for beginning the work of manufacturing part of the electrical equipment of the District line by the Westinghouse Company, who will supply their share of the plant partly from Pittsburg and partly from their new Manchester establishment. Although the Metropolitan Company have already announced their resolve to lose no time in proceeding with the installation of electric traction in accordance with the decision of the Board of Trade, it has not transpired how far this Company are prepared to go with Mr. Yerkes, who controls the District Company's policy. This affair of the Inner Circle railways is by far the most important matter of the year for electricians. It probably marks the beginning of a movement of which few living engineers will witness the end. As we have always maintained in these columns, electric lighting is as nothing, regarded as a field for electrical enterprise, in comparison with traction. Now that the electric light trade is losing its attractions for electricians, and they are admitting on all sides that incandescent gas lighting beats them, they will repine less for their lost kingdom by reason of their finding this fresh field of labour, in which they have no effective rivals.

For there can be no question that electric traction upon rails is emphatically the thing for the times. There is no alternative. It is not as it is in respect to lighting, which can be done by several different methods; or even in the driving of machine tools, lifts, and cranes. Electricity is the last expression of what is desirable for railway traction; and not even speculation contemplates anything beyond. Speaking for the owners of buried gas and water mains, we regret that the electrolytic continuous current should be preferred to the alternating current, which is inoperative in this regard; but it is useless to contend against the inevitable. If continuous currents are to be let loose all over the country, it will be necessary to be on the alert for electrolysis. The Board of Trade have been warned of this; but there will be no harm in jogging the memory of the Department again when details of the Metropolitan electrification come to be settled.

It will be interesting to give the heads of the report of the Hon. Alfred Lyttelton to the Board of Trade, conveying the reasons of the Arbitrators for the momentous decision at which they arrived after the recent exhaustive inquiry, already described here as "talking it out." The problem was to decide upon a system of operating "a circular railroad, in tunnel, through which a dense traffic is carried by trains frequently stopping, and rapidly succeeding each other, and where a large number of trains of foreign companies are at frequent intervals interjected." A luminous statement of the conditions! The first requirements of such a system are, precise and imperturable regularity, handiness, and safety in working. It was admitted that the continuous current system has given ample proof of its power to satisfy these conditions. On the other hand, the alternating system, importing a current of 3000 volts into the tunnels for working the trains by trolley wires, has never been tested upon any railway presenting the peculiar features of the Inner Circle. The elements of the plant proposed by Messrs. Ganz and Co. were novel and untried. It differed in important respects from anything in use even on this firm's experimental lines. This being the truth of the matter, the responsibility for imposing an experimental system upon "perhaps the most expensive and complicated conditions which could be found in Europe" was more than the Arbitrators thought themselves justified in undertaking. This decision is in no sense a reflection upon the alternating system, nor upon Messrs. Ganz and Co. There is plenty of room and to spare for applications of the system where it can have an opportunity of approving itself without injuring anybody beyond those who are responsible for making the experiment.

The latter consideration did not prevail in the case in point, where one of the partners—the District Company—were firmly opposed to the alternating system, on the sufficient ground of its experimental character. Their objection has prevailed; but Mr. Lyttelton does not let the Company off without a sharp rebuke for their conduct of the preliminary negotiations with relation to the proposed adoption of electric traction for the Inner Circle. This behaviour is qualified as having been "most embarrassing to the Metropolitan Company, and fully justified that Company in clearing the matter up by arbitration." Mr. Yerkes and his American capital have obtained the call of the District interest; but the other partners in the Inner Circle are not bound to follow him. There is no patent right or other monopoly in continuous current traction plant; and if the Metropolitan Company can buy in a cheaper market, they are at liberty to do so.

THE VIENNA MUNICIPAL GAS-WORKS.

(*Continued from p.* 1521.)

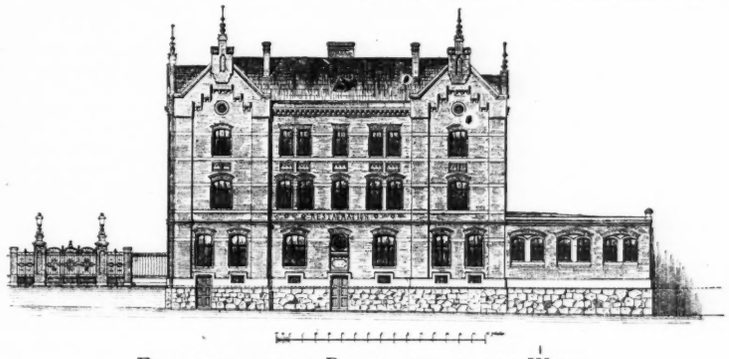
WORKMEN'S LOBBIES AND LAVATORIES, OFFICES AND DWELLINGS, MAIN-TESTING STATION, WORKSHOPS AND STORES.

THE coal is unloaded from the railway trucks and stacked; and the coke prepared and sold (for the present) through a Contractor, who is responsible for the arrangements of the men engaged in this work. The largest number of other men so far employed by the Municipality at the gas-works is 1400, and the smallest 600, on one day. The engine and boiler men and the workshop hands have accommodation provided in parts of the buildings in which they work. The workers in the retort-house have dressing rooms, lavatories, and bath rooms in temporary annexes on the two sides of the house. The washing arrangements include foot and shower baths and large porcelain wash-basins, set in iron tables with Monier slabs, and filled and emptied in batches by an attendant. On the front of the house facing the coal-yard, there are also nine annexes, each with a waiting room for the workmen, 23 ft. long and 15 ft. wide. In these annexes, but separated from the works' rooms, and communicating with the open by a passage 7 ft. 10 in. wide, are the closets and urinals, with ample flushing arrangements. The waiting rooms have the advantage that the men can rapidly get to and from their work; while too great numbers are not congregated in one room.

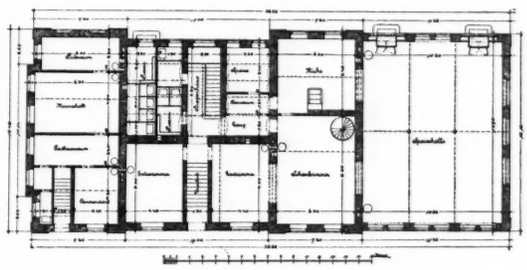
Dressing rooms for the purifying men are provided in a part of the tar-handling building. For the yard men, a special temporary building, containing two waiting and two dressing rooms, each 32 ft. 9 in. by 26 ft. 3 in., is provided in front of the meter-house. The dressing rooms are 23 feet high; and in order to overcome the sanitary objections to lockers, they are furnished with hooks for the clothes, which are drawn up, by means of cords on the walls, nearly to the ceiling. In each dressing room there are 358 of these hooks. Between the two dressing rooms is a bath room with foot baths, and twenty hot and six cold shower baths. The manipulation of the baths is put in charge of an attendant, as it has been found in the other bath rooms that even the most substantial appliances do not remain in good order if manipulated by the workmen themselves. On the first floor, and at the entrances, are offices and pay rooms. In the middle of the whole building is a high, airy room, with overhead lights, containing closets and urinals.

On one of the approach roads, leading from the Eleventh District to the gas-works, and at the entrance of the latter, is a restaurant and dwelling house. The dining room for workmen is on the ground floor in the annexe; while the restaurant and four rooms for watchmen are in the main building, with dwelling rooms for the restaurant keeper and foremen overhead.

The offices are in a building adjoining the coke-yard, and opposite the retort-house. It overlooks the whole of the yard and apparatus houses. Subsequently, a road will be constructed from the Third District of the city to the gas-works, where it will terminate in an open space in front of the offices. The building is 223 ft. long and 57 ft. wide. It comprises a central portion of three floors, and two wings of two floors. The second floor is

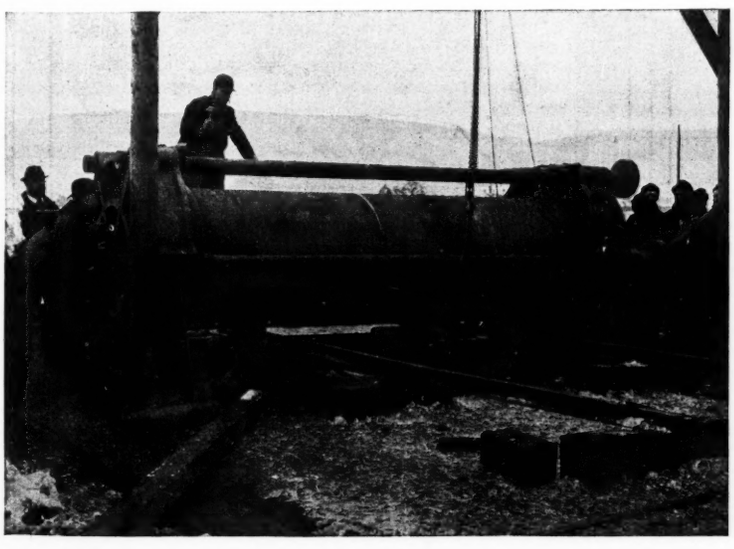


ELEVATION OF THE RESTAURANT ON THE WORKS.

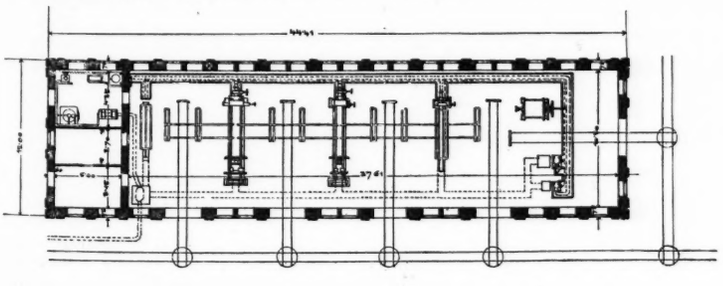


PLAN OF THE RESTAURANT.

for the residence of the Manager. The first floor contains quarters for four other officers. On the ground floor are the Cashier's office, the laboratory, quarters for a bachelor Doctor, surgery, and porter's rooms.



TEMPORARY APPARATUS FOR TESTING PIPES AT THE FOUNDRY.



PLAN OF PIPE-TESTING STATION.

It was necessary to make special arrangements for testing the pipes for the gas-mains, in view of the distributing system throughout the city having to be completed in the short time at disposal. A few large pipes were tested by temporary apparatus at the foundry (see photo.); but this took up much time, and necessitated the sending out of officials from the city staff. A testing-room, 123 ft. 4 in. long and 34 ft. 5 in. wide, was therefore erected, and equipped with four sets of apparatus for testing main pipes of from 2 to 48 inches in diameter, by means of water under pressure. Two sets can always be used for one and the same kind of pipe. The room also contains a press for testing gas-valves by means of air and water, and also apparatus for testing bends. Lengths of pipe from 32 inches to 13 ft., according to the diameter, can be tested with the apparatus. The latter is operated by means of a vertical tube-boiler 7 ft. 10 in. high, having three Galloway transverse tubes, and 74¼ square feet of heating surface, working at a pressure of 6 atmospheres.

This boiler operates a Worthington pump, which lifts water at the rate of 220 gallons per minute into two elevated reservoirs, each of 1580 gallons capacity. A vertical engine, with a cylinder 4¾ inches in diameter, drives three single-acting pumps, which deliver water up to 20 atmospheres pressure through an accumulator with plunger 8 inches and cylinder 10 inches in diameter, and a stroke of 8 ft. 2½ in. The water, when run off from the testing plant, can be either discharged into the drains or pumped up into the elevated reservoir. Pipes, 48 inches in diameter and 13 feet long, were tested within 7 to 10 minutes apiece, and pipes of smaller size in less time. Between Oct. 1, 1897, when the testing-room started work, and July, 1899, 141,000 pipes, of a total weight of 40,330 metric tons, were tested. Of these, 3500,

weighing 1034 metric tons, were rejected on account of faults. In addition, 158,444 gas-pipes, weighing 26,608 metric tons, were tested at the municipal testing-station at the water-works, and 2819 of them were rejected.

For making necessary repairs to apparatus on the works, there are provided shops in a building 150 ft. 6 in. long and 67 ft. wide. The machine tools in the shops are driven by a 35-horse power steam-engine.

As stores, two buildings, each 75 ft. 6 in. long and 39 ft. 4 in. wide, at the east end of the retort-house, are provisionally employed. They are connected by an open shed; and some old buildings existing on the site of the works are also used as store rooms. Most of the large stock of main pipes are stored round about the pipe-testing station. Gas meters, lanterns, and other articles connected with the distribution and sale of the gas are stored in fifteen railway arches on the boundary of the Ninth and Nineteenth Districts of the city. In connection with this depôt, is a small repairing shop and a gas-meter testing-station.

The Distributing System and Public and Private Lighting.

Herr Herrmann's original scheme embodied a distributing system substantially the same as that of the Imperial Continental Gas Association. As, however, the Association had six works, and no fewer than 27 mains emanating from them, their distributing system was clearly not the most suitable for supplying the same area from one large works, such as those now erected by the Municipality—unless, indeed, special storage stations were also employed. The distribution of the gas from one works, lying on one side of the city, required quite a different system of mains. In planning this system, it was necessary to bear in mind that the future extension of the city would probably be mainly towards the west—as is the case with most European towns—which is the side remote from the gas-works.

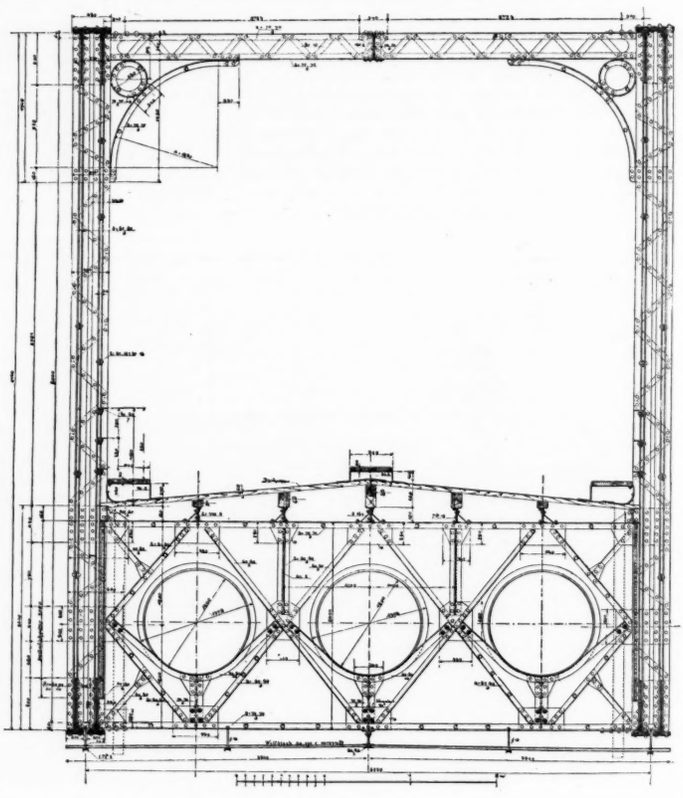
The Municipal Authorities had no definite information as to the amount of the gas consumption in the different quarters of the city; and they were not on such terms with the Association as would admit of it being obtained from that body. Hence, between January and August, 1897, a house-to-house enumeration of the number of burners, &c., was made; and this formed the basis of calculations as to the dimensions of mains required.

The district to be supplied varied much in level. Adjoining the Danube and the Danube Canal the land is flat, and rises only to a moderate extent, passing up-stream from the gas-works. On the other hand, coming near the Danube Canal, is the margin of the plateau and eminence on which the greater part of the city of Vienna is built. They are separated by the low valley through which the Vienna River and streams, which are now covered over, run. Hence the area to be supplied was naturally cut up into several well-defined districts, for which special pressure regulation would be required. In planning the laying of the distributing mains, it was necessary also to have regard to the time by which the pipes could be delivered. The German standards for the sockets, &c., were adhered to; and the greater part of the pipes were ordered of the United Bohemian-Moravian Iron-Works, which undertook to deliver 22,500 metric tons yearly, in equal monthly deliveries up to March, 1899. Smaller quantities were to be supplied by other firms.

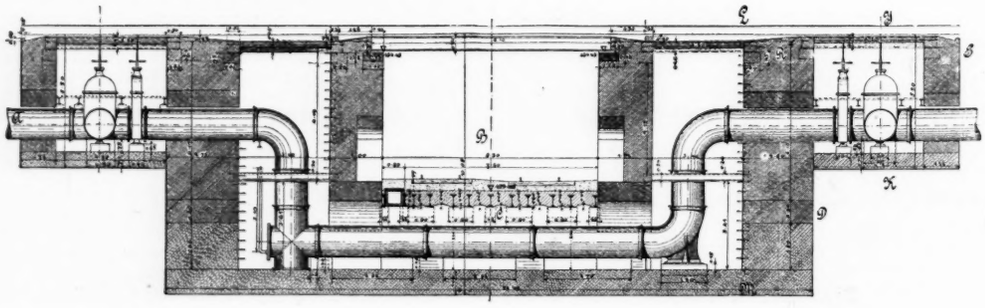
The scheme ultimately adopted provided for six mains to convey gas from the works to the city. One of these, supplying the Third District, which lies near the gas-works on the north-west side, is 27½ inches in diameter. The Tenth and Eleventh Districts, lying immediately west and south of the works, are supplied by a main 43¼ inches in diameter. The remaining four mains are all nearly 48 inches in diameter. One passes in a nearly straight line through the Third to the Fourth District, which lies to the south of the central district of the city, and thence to outlying parts. The other three 48-inch mains cross to the left bank of the Danube Canal by a new bridge, since there was only room beneath the towing path on the right bank for the 27½-inch main for the Third District. One of the three supplies the part of the city which is on the left side of the canal; while the other two recross to the central district, and pass on to the outlying districts to the east of the town. The mains in the different districts are connected up, so that any section can be supplied from either end; but normally each distributing section is kept distinct, by closed valves on the connecting mains.

There are valves on the mains on either side of the bridges which carry them over the canal, and connecting mains so placed that any length of main traversing a bridge may be shut out in case of fracture. There is a difference of level of 330 feet between different parts of the distributing system. The system was based on the gas leaving the works at a pressure of 2·8 inches; and as the bell or inner lift of each gasholder alone throws a pressure of 4·9 inches, there is an ample margin for raising the distributing pressure to meet later requirements. For the present, in pursuance of the undertaking with the Imperial Continental Gas Association, the municipal distributing system is confined to the central districts within the former city boundary, the Eleventh District, and two suburbs. A group of small towns some distance away on the left bank of the Danube are also supplied through a main which has no service pipes for a distance of 8½ miles. The total length of mains laid is nearly 360 miles. The cubical content amounts to a little over 2 million cubic feet. There are 15¾ miles of 48-inch mains, and 88 miles of 6-inch. The smallest size used is 2·8 inches, of which, however, there is but a small length laid.

The laying of the mains in the city was a matter of no small difficulty, owing to the great number of other pipes and drains in all the principal streets. The mains on the left bank of the Danube Canal were, in consequence of the bad nature of the subsoil, mostly laid on separate concrete blocks, with the sockets at the intervening spaces, in order to facilitate working at the joints. Where the soil was silt, it was removed, and the mains were laid on concrete resting on piles driven into the firm subsoil.



Cross Section Through Pipe Bridge.



Detail of Pipes Crossing Under the City Railway.

Special attention was given to thoroughly ramming the material with which the trenches were filled up, in order that the laying of the mains should not leave evidences on the surface of the streets. The laying of the mains was for the most part finished by the end of 1898. The greatest length completely laid in one day was 3280 yards.

The bridge which carries the trunk mains from the works over the Danube Canal is formed of two iron girders of hemi-parabolic form, having a span of 210 feet. They are 11 ft. 6 in. high at the ends, and 27 ft. 10 in. in the middle, and are placed 21 ft. 6 in. apart. The top and bottom flanges of the girders are of U-pattern cross section. These two main girders are joined by seventeen transverse lattice girders, 7 ft. 8 in. high, in which the wrought-iron gas-mains are supported by means of bent angle irons. On the top of these transverse girders are seven longitudinal beams, which at present support a light roof, but later may be used to carry a plank bottom to enable the bridge to be used as a foot-bridge. In the calculations for the bridge, allowance was made, apart from the weight of iron, for a traffic load of 82 lbs. per square foot (see cross section of the bridge). A view of the bridge was given in the "JOURNAL" for April 2 last, p. 877. The mains on the bridge are of ¾-inch plate, in lengths of 13 ft. 2 in. They are not covered in, but are protected at the sides by cross bars, and at the bottom by galvanized corrugated iron sheets.

At the two abutment piers, there are erected small buildings to contain the vertical connections, cross connections and valves, stairs, and syphon pots. Provision for the dilatation of the mains is made by means of tripartite ⅛ inch thick discs, 70 inches in diameter. The weight of the bridge is 175 metric tons, and that of the mains 64 metric tons. The whole of it was erected and finished in less than twelve months.

The main which crosses the principal stream of the Danube by Crown Prince Rudolph's bridge is provided with a stuffing-box device to compensate for dilatation. The public bridge by which two of the 48-inch mains recross the Danube Canal to the central district of the city did not admit of circular pipes being employed, and hence rectangular mains were used on this bridge. These two 48-inch mains are carried under the city railway line, which lies in a thickly-walled cutting, by means of a vertical shaft on each side of the line and a connecting tunnel. The tunnel is 19 ft. 8 in. wide, and 8 ft. 2 in. high. It is roofed, under the railway metals, with concrete arches between the girders 20 inches deep. The bottom and sides of the shafts and tunnel are of concrete; but the mains are weighted to prevent their displacement in case water should at any time flood the shafts and tunnel. The shafts, tunnel, &c., are shown in section.

Each section of main was tested for soundness, before being covered in, by air at 12 inches (water) pressure—soapy water being carefully applied to all the joints. In order to prevent any explosive mixtures collecting in the newly-laid mains, through fractures which would inevitably occur in some places before the completion of the system, air was pumped into the finished sections, and maintained therein at considerably higher pressure than that of the gas in the Imperial Continental Association mains. For this purpose, four small pumping stations were erected. In order to facilitate the detection of leaks by smell, the air used was odorized by means of carbylamine; but this plan did not answer very well where the mains were at a considerable depth. At distances of 65 feet, perforated vertical pipes were carried from the top of the mains to the surface of the road, and covered with a perforated cap and cast-iron box top. These ventilating pipes were packed with coarse ballast, in order to prevent explosions from escaping gas, and their mouths were put on the footways.

It was decided by the Municipality that the Welsbach light should be generally employed for public lighting; and arrangements for fitting the necessary burners were accordingly made with the Austrian Incandescent Company. The use of flat-flame burners is now confined to a few places where it has not yet seemed desirable to make the change. Actually, there are 442 flat-flame burners not yet displaced, which is only 2·1 per cent. of the total number used for public lighting. For the ordinary streets, the lamps are each provided with one incandescent burner; but in prominent positions, two burners are used in each lantern. The lamps are, on the average, nearly 100 feet apart; but the distance varies with the local requirements. There are 16,440 lamp-columns, of which 4560 are for lanterns with two or more burners, and 2690 wall brackets. The service-pipes are ¾-inch and 1-inch. At midnight 12,552 burners are extinguished; while 8936 are kept alight all night. The base of each lamp column is cast separately; and the column is screwed to the base. The plans for the street lighting were drawn up by the Building Department of the city. At important crossings, bridges, &c., the old columns and lanterns were used, after having been adapted for the use of incandescent burners. A public competition, with prizes ranging from £8 to £85 in value, was promoted by the Municipality for designs for lamp-columns, wall brackets, lanterns, governors, and lamp lighting appliances. Difficulties in executing the successful designs for columns and brackets led to their being modified by the Building Department. A modified form of Ritter lantern was adopted for use on the columns, and a suspended lantern for the wall brackets. The suspended lamps, and lamps with more than one burner, are provided with a small flame, constantly alight, for lighting them; but the ordinary street-lamps are lighted by means of a torch. Most of the burners are provided with Behl's governors, set for a consumption of 3·7 cubic feet per hour.

The service-pipes from the street-mains to consumers' premises are of wrought iron, except when they exceed 3 inches in diameter, when they are of cast iron. The wrought-iron pipes are protected from rusting by a coat of asphalte; but the cast-iron ones are uncoated. Cocks are placed outside the houses on all service-pipes of 2 inches diameter and upwards. The Municipality, after exhaustive investigation, decided to use wet gas-meters, except in some special cases. The question of connecting the meters when the supply of gas was taken over by the Municipality was a most important one, and was dealt with by a Special Sub-Committee. Certain rules were made for meeting the various cases likely to arise. But ultimately the chief difficulties were set aside by an agreement being made whereby the meters of the Imperial Continental Gas Association were to become the property of the Municipality at the expiration of the Association contract. It thus became necessary merely to connect up the Municipality's service-pipe with the meter at some point in the existing service-pipe between the meter and the tap which shuts off the supply. Where such a tap existed outside the building, the service-pipe from the Municipal mains was connected to the existing service between the tap and the meter; and a tap was inserted on the new service-pipe alongside the existing tap. A casing was placed over the two taps, so that the change could be effected at once from the pavement. There were 5200 connections made in this manner. In the majority of cases, however, there was only a short length of pipe between the tap and meter; and in these cases the new service-pipe had to be connected here, and provided with a tap. Special precautions were taken to prevent the consumer opening this tap until the supply of gas was begun by the Municipality. The number of connections made in this manner was 27,100. The length of the service-pipes put in amounted to about 234 miles.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1623.)

THE course of business upon the Stock Exchange last week was not distinguished by any prominent characteristic. Tendencies varied from time to time, sometimes one way and sometimes the other; but they never moved very much in either direction, and no startling change was apparent anywhere. On the whole, the balance was rather favourable; and this was observable in the best departments, which were influenced by the better news from South Africa. The feeling at the close was perhaps the best of the week. The Settlement was, of course, a chief consideration; and this was not a heavy or a difficult affair. There was a demand in the Money Market, and all rates hardened considerably; but the stringency slackened before the close. Business in the Gas Market was decidedly below the fair average; and even the leading issues showed no disposition to any degree of animation. The volume of transactions was thus a light matter; and they were more evenly distributed than usual throughout the general list. The tendency, on the whole, was not good, so far as ordinary stocks were concerned; but in debenture and preference issues, some very fair advances were scored. In Gaslights, the ordinary showed a reduced number of transactions, and displayed some weakness. Opening at 99½, it began at once to fall away; and on Friday it changed hands once at 95. But the closing mark on Saturday was 96½, with a total fall of three points on the quotation. Moderate business was marked in the secured issues, and no change took place in them. South Metropolitan was very quiet; and the few transactions recorded did not indicate any tendency to move. In Commercials, a few dealings in the old stock were marked at about middle figures; and the debenture stock had a smart rise *ex div.* In the Suburban and Provincial group, business was, as usual, very limited in the London Market, and the only move was a fall in Brighton. In their local Exchanges, both Liverpool and Newcastle had advances; but Sheffield "B" and "C" stock receded. Among the Continental Companies, business was very slack, and prices for the most part were poor; but Continental Union preference had a rise *ex div.* There was scarcely anything to note in connection with the remoter undertakings, except that River Plate was fractionally easier. The Water Companies offered no feature for remark; being quiet and unchanged, except where *ex div.* alterations took place. The result of these was to place the debenture issues in a rather better position.

The daily operations were: Gas opened quietly on Monday, and was never brisk all the day. River Plate fell ¼. Tuesday was quieter still. Gaslight ordinary receded. Wednesday was another very slack day. Gaslight ordinary again receded 1, and Continental Union fell 1. On Thursday, business continued to be very limited; and the only move was a rise of ½ in South Metropolitan debentures. Friday was a little less inactive. Gaslight ordinary fell 1, and Brighton and Hove ordinary 5. Saturday was quiet, with a rather better tendency: and quotations closed without further change.

The many friends and business connections of Mr. Alfred J. Bale, of Messrs. Bale and Co., 122, Newgate Street, will, we are sure, learn with regret of his sudden death, from syncope, on the 2nd inst. He had returned from a short business journey, and was proceeding home from the office, when he was seized with illness, and expired in his son's arms. Deceased, who was 55 years of age, had long been connected with the gas industry.

AN IRISH VIEW OF MUNICIPAL TRADING.

Advantage was taken by the President (Judge Shaw) of a recent meeting of the Statistical and Social Inquiry Society, in Dublin, to expound his views on the subject of Municipal Trading. In connection with the Irish capital, one's thoughts seem naturally first of all to turn to the subject of gas supply; and this appears to have been the case with the author, for almost his opening words had reference to this matter. After dwelling upon the fact that one of the most strongly marked characteristics of the older school of British Political Economy was its intense jealousy of State interference with the process of industry or the course of trade, he illustrated the contention that the supply of an article might be a monopoly in one sense, but not in another, by pointing out that though a company might have an exclusive right to supply gas, this did not confer an exclusive right to supply light. But if the supply of gas was in the hands of the municipality, it was sometimes possible for them to forbid competition by electricity; and this showed how much more rigid, and how much more dangerous, a monopoly might be in the hands of a corporation than it could ever be in those of a private company. It seemed to him an incontrovertible argument that the public interest was more likely to be safeguarded by the existence of a private company whose operations were supervised by the municipality than by the corporation carrying on the business without being controlled by any other authority.

The "Freeman's Journal" remarks that "there is something refreshing in meeting with a fine old crusted Liberal *doctrinaire* of the last century, engaged in the now ever-rarer occupation of cracking up the teaching of the *laissez faire* principle, and damning all governmental interference with industrial affairs." Well, the last century has not so long been a thing of the past that the doctrines held during it need necessarily be out of date. Besides, even if Judge Shaw is "an interesting relic of the economic past," change does not inevitably spell improvement; and so far from it being the case, as our contemporary would have us believe, that all denunciation of municipal monopolies is dead, the ever-increasing (and apparently insatiable) desire of public authorities to engage in trade, is in very many quarters regarded with apprehension, and even with alarm. The "Freeman's Journal" remarks that the people who are at present paying for gas 4s. 6d. per 1000 cubic feet within the city of Dublin are fully able to appreciate the effectiveness of municipal supervision and control, "when they journey to Belfast, Glasgow, or Liverpool, where the people themselves are the owners of the city lighting." Liverpool, though it enjoys a thoroughly efficient gas supply, is a somewhat unfortunate case to quote for the purpose of proving the superiority of corporation management over private ownership. We wonder who will feel the more flattered—the Liverpool Gas Company to be regarded as a model municipal trading concern, or the Liverpool Corporation to be thought the managers of such an excellently conducted business?

But what, it may be asked, is the nature of this paper by Judge Shaw that has so raised the ire of the "Freeman's Journal?" In our opinion, it is a complete answer to many of the advantages claimed by the advocates of municipal trading—namely, that a corporation can obtain their capital at a much cheaper rate of interest; that they practically make the people, whom they represent, partners in the concern, who thus become interested in its welfare and support it; that they have no dividends to declare; and that there are many men who would devote their public life to carrying on these undertakings rather than ally themselves with private businesses. These were the points on which the writer mainly directed his attack. If, he said, municipal ownership possessed all these enormous advantages (in cheapness and efficiency of production) over the private trader, the logical result would seem to be that the community should possess themselves of all the instruments and agencies of production, and become the sole caterers for the wants of the citizens. The fact, however, of course was that the cheaper capital meant that the municipal trader, instead of borrowing on the security of the solvency and success of his trading, was able to pledge the rates for the repayment of his capital, and that the success and solvency of his trading were therefore not of vital concern. The absence of the necessity to declare dividends meant that the municipal trader had not angry shareholders to meet if he bungled his business and landed it in financial difficulties. The unpaid management meant that the trade was conducted by men who had had no special training for the business, who had their own affairs to attend to, and who were able to give only a corner of their minds to what was everybody's business and nobody's business. The partnership of the whole community in the concern meant that every ratepayer, whether he wished or no, was compelled to take shares in a business over which he had no control, managed by men of whose capacity he had no proof, and in many cases using capital, supplied by himself, to supplant and ruin him in his own trade. This is a strong indictment, but who shall deny its justice? We would, however, point out that, though there are no angry shareholders to confront public men who mismanage businesses of which they are given charge, it is not quite the fact that the ratepayer has no control—as witness the unhappy fate that has overtaken the Bath Electric Lighting Committee, following on a deputation of ratepayers to the Town Council.

Judge Shaw says that if these are the conditions of successful trading, we must revise all our notions of human nature, and renounce all the maxims of homely wisdom which embody the experience of our forefathers; and if unpaid, amateur management, easy and irresponsible borrowing, no stimulus from competition, and the absence of any necessity to show a good balance-sheet make for the success of municipal enterprise, then it is clear that men and things in municipal life must work on wholly different principles from those which hold good in private life. If, argues the author, to the necessary work of local government are to be added the direction and management of several large and increasing branches of manufacture and trade, the consequence must be that the primary duties of the local governing bodies will be neglected, that the municipal trading must be left without adequate supervision or control, or that men who have businesses of their own to attend to, and can give but a moderate share of their time and energy to the work of the municipality, must abandon the work of local government to others. "Men of high character and position in the commercial world," he says, "will neither consent to neglect their own business nor continue to be responsible for public business to which they cannot properly attend. The consequence must be that municipal affairs will tend to fall into the hands of a most undesirable class—men who have no business of their own to attend to, and make a business of municipal politics." We do not altogether agree with these remarks; for our trading corporations present many instances of men of "high character and position in the commercial world" who display the utmost devotion to the public affairs of their respective towns, and we refuse to believe that the time will ever arrive when such men will not be forthcoming. Taken altogether, however, Judge Shaw's paper is a sound contribution to the vexed question of municipal trading; and, though his arguments are perhaps not new, they provide material for its advocates in Dublin to ponder over and refute—if they can.

OBITUARY.

We regret to record the decease of Mr. W. R. Hammond, the Secretary and Manager of the Deal and Walmer Gas Company, which occurred at his residence, No. 39, Victoria Road, Deal, early on Monday, the 9th inst. The deceased gentleman was taken seriously ill about a month ago; and the disease not yielding to medical treatment, surgical operations were resorted to. But he gradually sank; and, owing to his advanced age (83), there was a lack of recuperative power. Mr. Hammond had held the position of Engineer and Manager for several years; and in 1891, he was appointed Secretary and Engineer. During upwards of thirty years' management, the works were entirely remodelled on progressive lines—in a large measure due to his initiative. Deceased was greatly respected, both by his fellow townsmen and the employees of the Company.

PERSONAL.

Mr. Hawksley Ayris, grandson of Mr. John Ayris, M.Inst.C.E., of Norwich, was one of the successful candidates at the recent examination for studentship of the Institution of Civil Engineers. We understand that he has qualified at the lowest age allowed by the rules of the Institution.

It is stated that there will be no vacancy to be filled up in the post of Water Engineer at Halifax. Mr. J. A. Paskin, whose resignation was announced in our issue of the 3rd inst., will be the Consulting Engineer; and at present the duties will be discharged by the Assistants, Mr. Hartley and Mr. Drysdale.

At a special meeting of the Arbroath Gas Corporation last Thursday, Mr. A. C. Young, of Kelso, was unanimously selected to fill the position of Manager of the gas-works, in succession to Mr. R. S. Carlow, and he will enter upon his duties there on the 1st prox. Some particulars of Mr. Young's career will be found in our Scotch Correspondent's "Notes."

We are informed that Mr. C. Richmond has resigned his appointment as Superintendent of the Nechells Gas-Works of the Birmingham Corporation (which he occupied under Mr. Henry Hack, M.Inst.C.E.). It will be remembered that Mr. Richmond succeeded Mr. E. A. Harman in 1898 as Superintendent of the Swan Village Works; and he was afterwards transferred to the Nechells Station.

It may interest readers to know that Mr. Donald D. Macpherson has retired from the active management of the firm of Messrs. Donald Macpherson and Co., Limited, Knott Mill, Manchester. It is twenty-five years since Mr. Macpherson first came personally into contact with the gas profession; and there was a time when he was perhaps one of the best known of those whose *métier* it is to seek for business among the various gas companies of the country. He will, we are sure, have the best wishes of many in his retirement.

Mr. G. F. L. Foulger, the Distributing Engineer of the Gaslight and Coke Company, had the pleasure, last Wednesday evening, of presenting Mr. F. Wadeson with a diamond ring, cigar case, and case of pipes, subscribed for by many of his colleagues, on his retirement from the position of Stove Clerk at the Company's distributing station in Goswell Road, after 42 years' service. A diamond and sapphire ring was also presented to Mrs. Wadeson. In handing the gifts to Mr. Wadeson, Mr. Foulger spoke of the

pleasant relations which had always existed between them, as well as between Mr. Wadeson and his brother officers, and of the great regret all felt at parting with so genial a colleague. They all wished him long life to enjoy the pension which the Directors had conferred on him. Mr. Wadeson, in his reply, gave a short history of his association with the Company from the time the works were in Buck Lane, and concluded by returning his heartiest thanks to them all for their kindness in giving him such beautiful presents, which he assured them he should always value as mementoes of their good fellowship. Mr. Wadeson is the brother of Mr. James Wadeson, who recently relinquished the position of Manager of the Windsor Gas-Works, which he had filled for many years.

Agricultural Value of Sulphate of Ammonia.—We learn from the report of the Reigate Agricultural Society's Show, held on the 4th and 5th inst., that the winner of the first prize for mangolds produced a crop which weighed no less than 75 tons per acre; while his neighbour came first with potatoes, with an equally fine crop of 18 tons to the acre. Both of these weights are the highest ever grown in the district; and it is interesting to find that these excellent crops were produced by the aid of sulphate of ammonia. The fact has not been allowed to pass unutilized by Mr. Douglas Helps, Engineer and Manager of the Redhill Gas Company, who has brought it under the notice of growers by means of a circular containing the foregoing particulars from the report, and a reminder that the Company are manufacturers of this valuable manurial agent.

"Premier" Gas-Engines for Mond Gas.—The November issue of "Engineering Times" contained illustrations of two gas-engines made by the Premier Gas Engine Company, Limited, of Nottingham, for working with Mond gas. One is a tandem engine, indicating 650-horse power at 130 revolutions per minute; and the other is a single-cylinder engine of 250-horse power. The former has two motor cylinders; the pistons being connected by side rods and crosshead. Explosions take place alternately in each cylinder; one occurring at every out-stroke. The space behind the front piston forms an air-pump, drawing in air on each out-stroke, and discharging it, with the products of combustion, on each back-stroke. The cycle of working is explained; and it is claimed that the arrangement and mechanical details adopted result in avoiding premature explosions, in realizing higher mean effective pressure in the cylinder than in ordinary engines, in keeping valves and engine-surfaces clean and cool, and in preventing the burning of the exhaust valves and the carbonizing of the piston oil. Long periods of running can thus be maintained without much cleaning or attention.

A Power Gas from Petroleum.—The "Iron Age" describes a recently invented gas known as Acme gas, which is manufactured by a process owned by the Acme Gas Company, of Chicago. It is made from petroleum; and less than 2 gallons are, it is said, sufficient to generate 1000 cubic feet. It is a gas of high calorific efficiency, and makes a soft penetrating heat. The plant consists of a series of generators with connecting apparatus and pipes which work automatically. The novelty lies in the appliance whereby petroleum is made into a fixed gas, by forcing air with a pressure blower under a pressure of 3 lbs. through the oil, and through perforated diaphragms and a porous material. This process is continued through a series of generators—the number depending on the volume required. The oil is entirely used up. The gas produced is a light fixed gas, free from unassimilated hydrocarbon in any form. The plant automatically regulates the manufacture of gas to the requirements. The gas can be utilized for welding, forging, crucible work, smelting and furnace work, and tempering and heating purposes; while for illuminating purposes, it is said to have proved excellent. A plant has been running for some time in California, using California distillates to manufacture gas for operating engines, furnishing fuel for furnace work, and lighting one of the largest factories in the West.

Exhibition of the Nernst Lamp in Birmingham.—Last Wednesday there was a demonstration of the Nernst electric lamp by Dr. D. K. Morris before the Birmingham members of the Institute of Electrical Engineers. It was the first time the lamp had come under the notice of a Birmingham audience, and the exhibition of its advantages was followed with keen interest. A local paper points out that the necessity of providing a vacuum for the carbon filament, which has proved such a costly feature of the electric globes at present in use, is dispensed with in the Nernst lamp, which depends for its action on the very great increase that takes place in the conducting power of metallic earths when heated to the point of incandescence—the heat being obtained from a current of electricity transmitted through the adjacent coil. The lamp will burn plainly in the air if the globe is removed; and its efficiency is decidedly greater than in the case of the ordinary electric lamp, while the cost of current is less. The light afforded by it, in fact, is distinctly whiter than that given by either the incandescent gas-lamp or the arc lamp. After about 200 hours' use, however, it has been observed that there is a drop of 40 per cent. in the candle power of the Nernst lamp, though the manufacturers claim that, as only one portion has to be renewed, the balance of advantages is still on their side. By means of this invention, too, it is possible to make electric lamps of 100 and 200 candle power, which could not conveniently be had hitherto.

NOTES.

Gas Explosions in Smiths' Bellows.

Some interesting experiments with explosive mixtures of carbonic oxide gas and air have been recounted in the "Ironmonger." These experiments were invariably unintentional; being described as "explosions in smiths' bellows." Probably very few of the explosions which supplied the examples drawn upon for illustration in this connection were perfectly understood by the operators, who can rarely have heard of carbonic oxide gas. These explosions are not rare, and they do not usually cause much damage. Sometimes, however, they attain alarming, if not very dangerous, proportions. The cause is, obviously, the sucking back of gas from the hearth into the bellows, which may happen in various ways. The most general cause is probably that described by a correspondent of the "Ironmonger," who cautions his readers against holding down the handle of the bellows until all the air is out of it. If this should be done, when the handle is released the fall of the bellows will almost of necessity draw back some gas from the fire into itself, with the result in question, when starting to blow again. The best prevention of the annoyance is that prescribed by another correspondent, who directs that the nozzle of the bellows should never be sealed tight within the iron. If the nozzle has a clear space of about $\frac{3}{4}$ inch between itself and the tue iron, nothing of the sort can happen. The caution is valuable in connection with the fitting up of large smiths' forges.

Gas Lime as a Vermicide.

A writer of "Hints to Housewives" in the "Midland Counties Express" recently gave a few "Hints" on the use of gas lime for killing wireworms, for which purpose it can be very usefully employed. Its efficaciousness as a vermicide has been proved beyond question; but the quantities used per acre, and the time of application, appear to differ widely in practice. Farmers who have had the destruction of the wireworm as the only object in view, have been able to effect this by comparatively small dressings; while others, who have also had the further object in mind of refreshing the soil and distributing plant food, have applied considerable quantities. The time of application is governed by the period at which a crop is required to succeed it—gas lime being injurious to vegetation if fresh from the works; but when air has had time to act upon it, the acids are neutralized, and it then becomes a valuable fertilizer. When it is used for killing wireworms only, the fresher and more caustic it is the better; and if these conditions are fulfilled, smaller quantities will suffice than if a lime were used which has been exposed to the air for some time. After quoting extracts from reports made to the Royal Agricultural Society on this subject, the writer concluded by saying that the best time to apply gas lime for the prevention of wireworm is in the autumn or spring, when its habits bring it to the surface. The insect prefers keeping beneath the soil, as it cannot endure the sun or dryness; and as it dislikes cold, in severe winters it retires too deep into the earth to do any mischief at that season. The crop following the dressing must, however, decide the time of application; for it would certainly be injured if the lime had not had time to become neutralized by the atmosphere. The reports quoted do not favour large dressings.

Solders and Soldering.

An article in the "Ironmonger" gives some useful information concerning solders and soldering. It is pointed out that a proper understanding of the principles which govern the composition and the use of solders would enable users to make strong and satisfactory soldered joints where, without this knowledge, their work may fail to stand the test of hard wear and strain in actual use. The process known as soldering is the union of two metallic surfaces by the interposition of a third metal or alloy, which fuses at a lower temperature than the metals joined by it. A sound principle is that the melting point of the solder should not be too much below that of the metals for which it is to be used, so as to avoid unnecessary difficulties arising from expansion and contraction. Soldering is broadly divisible into the two classes—hard soldering and soft soldering. The former requires the heat of a blow-pipe to effect it; the latter can be done by the heat of a copper bit. Hard solder is best bought, as it does not pay to make. Wherever possible, a gas blow-pipe should be used in doing this work. Blow-pipe flames with petroleum instead of gas as fuel should be avoided if gas can be had. There are several appliances in the market for brazing, or hard soldering, by petroleum. As a rule, they are not satisfactory in practice. There is a great deal of soft soldering done in connection with gas-fitting. Ordinary soft solder is a mixture of tin and lead; and by increasing the proportion of tin up to about 70 per cent., the fusing point is lowered. The melting point of tin is 440° Fahr., and of lead 620° Fahr. Yet an alloy consisting of two parts of tin and one of lead fuses at 338° Fahr. For ordinary tin-plate soldering, equal parts of tin and lead are usually alloyed to make a solder. The value of the solder and the quality rise as the proportion of tin is increased; but 60 per cent. need not be exceeded. Pewterers use an exceedingly fusible solder made of 50 per cent. of bismuth, 25 per cent. of tin, and 25 per cent. of lead. It fuses at 203° Fahr.

Water Supply from Driven Wells.

According to some particulars given in the "Engineer," the water supply of the city of Drayton (U.S.A.) is pumped from

driven wells, designed to intercept the underflow through the glacial drift of three rivers which combine at this point. The wells extend for a distance of about 3800 feet along the course of the Mad River. The pumping-station is in the midst of the valley; but until a few years ago all the water required by the population of 85,300 persons flowed from the wells by natural pressure. These are from 25 to 80 feet deep, passing through 15 feet of loam mixed with clay and sand, then clean loose gravel and sharp sand. All new wells are of 8-inch galvanized pipe, with brass strainers from 8 to 10 feet long at the bottom. The pipe to the suction main has a valve, so that any well can be shut off. One suction main is about 1000 feet long and 20 to 66 inches in diameter. This has 22 wells, supplying 7½ million gallons in twenty-four hours. The other suction main is 1900 feet long and 5 feet in diameter, with 56 wells; while a 30-inch branch has 15 wells. These 71 wells supply 28½ million gallons in 24 hours, making a grand total of 36 million gallons. The suction lines on either side of the main or header have a fall of 1 inch in 100 feet from the main, and the well connections have a fall of 6 inches in 100 feet. This is to prevent air pockets forming in the pipes and obstructing the flow. The wells are cleaned out occasionally by injecting water with a steam fire-engine, and then pumping it out rapidly with a centrifugal pump. This is the largest city in the United States which obtains its water supply by the tube-well or driven-well system. At the city of Tipton, with wells 4 to 8 inches in diameter and from 35 to 500 feet deep, the supply at one time yielded only 180,000 gallons per day. Experiments with the air-lift, or jet, system increased this to such an extent that the system was adopted. The compressor has cylinders 10 in. by 12½ in. by 12 in., and runs at 32 revolutions, carrying 33 lbs. pressure for a 40 feet lift.

COMMUNICATED ARTICLES.

GAS MATTERS IN THE UNITED STATES.

Meeting of the American Gaslight Association.

By the time this reaches you, you will have had your abstract; and the only thing I can add is personal impressions. These are most certainly various indeed. In some respects (notably in the matter of the papers), the meeting was one of the most interesting which I have ever attended; in others, it was not so. Whatever the matter was—whether it was in the air or the climate, the place, or in us—the members were not at their ease during any one of the sessions. I said to one of them that the meeting—that of the second morning—might sit for "waiting for a verdict;" and he replied: "I fancied the feeling was my own." This same unrest was shown in the hypercritical air of the discussions, and the evident irritation of many speakers—sometimes leading them to say things of infinite value to those interested.

It is useless for you to look for this in the published numbers, or in the annual reports; for the alleged sayings are by no means such. The members are so very careful of their dignity (or is it their reputation?), that they edit all their sayings before they are printed. The opera-bouffe, which is so marked in American life, is splendidly illustrated in this. The Association employ a real stenographer. He does his duty; and then the Secretary does his, which consists in sending to each member a copy of what he did say. This said member then consults his memory, or his discretion, and edits his remarks into what he thinks he should have said. The result is absolutely funny; as, owing to the informality, the *bonhomie*, and the give-and-take of the meetings, the discussions are largely conversational; and a member maybe will ask and answer a question. Then, as the "cues" are not given, the revision consists in erasing a valued answer.

The result has been provocative of much ill-feeling, because the members often erase such sayings as discretion cold advises against printing; and then they refer to the printed copy as proof that they never did say such things. It is to be hoped that some time the Secretary, who is to the greatest degree to blame in the matter, will call a halt, not on real elucidations, but on erasures. This may explain why the impressions made on those who listen are so different from the impressions of those who read—shall I say the discussions (or critiques?) in the published reports.

You may have noted the protest in the "American Gaslight Journal" on this method. It voices a protest which, in proper form, I believe every member of the Association whom I have met would sign. The present method is not only puerile, but dishonest, and renders the annual publication, which otherwise would be of the greatest value, nearly worthless.

The papers which really made a stir were few. The champion seller of stoves, Mr. Moses, is still quite sure that heating, and not lighting, is the future business of gas. But surely if "heat, light, and power companies" are to take the place of the gas companies, they must do it on a "flat rate." Their business is to make and sell the gas; let the purchaser use it how he may.

The paper on the "Fuel Value of Residuals" did not have a fair show. It was one requiring careful study to appreciate, which study it did not have, for it was impossible to study it without reference to other figures not to be got at a moment's notice. But this paper only emphasizes the fact that the best theoretical discussion is of no practical use unless experiments are made to find the "co-efficient" between practice and theory. The design of a furnace has so much to do with the efficiency or inefficiency of any particular fuel, that the values given by Mr. Pritchard on the theoretical heat contents will afford but little information as to the results in a test run. It is the old question, analysis *v.* the calorimeter.

Mr. Littlehales' paper on "Retort Ovens" also deserves special notice. It was the best literary production given. It showed Mr. Littlehales' well-known habit of industrious collection of data, as well as his wide acquaintance with the subject.

The paper by Mr. M'Kay was another one which showed wide research, as well as a careful study; but it was not appreciated by many. One man said in the lobby: "M'Kay seems to have exhausted the subject; he certainly has his hearers' patience." This paper, like the one on residuals, requires to be read to be appreciated. The necessity for sustained attention wearied me much, as I was interested in the subjects in hand; nor did I fully appreciate them until I sat in an armchair, with a pipe in my mouth and two candles—yes, candles—at my elbow.

This reminds me, there is a man in this city who makes mantles, and has them on every fixture in his house, and yet has candles on his own table for study. I asked him once his reason. He laughed, and said: "Beauty in the table furniture."

The Superiority of the Welsbach Mantle.

This city, if I may use the phrase, is plagued with a dire plague—to wit, cheap mantles. In some parts of the city, in certain "department" shops, they can be purchased for 20 cents (say, 9d.), and shade and all for $1. Fixtures, utterly out of date, of course; and the mantles—well, the less said about them the better. There is one kind of mantle made "with a seam up the back;" and they always give way on this line. There are fully twenty mantles under trade names sold in various shops, each and every one claiming to be just as good as a Welsbach; and one man has "Agency for Welsbach Mantles" on his business sign, and not one mantle in his shop. I carried out an exhaustive differential study of the various sorts of mantles about three months ago, during which I made, or caused to be made, nearly 10,000 measures. When the whole set of figures was summed up, the Welsbach came out ahead as follows: In radiation per square inch, 33 per cent. better than the average; in durability, 27 per cent. If they would but make the superiority of their goods "understanded of the people," it would be a great gain on both sides. But they will not; and the sale of the inferior mantles increases day by day. Perhaps they think that cheap mantles are educating the people. So they are; but they are also improving.

A Curious Phenomenon.

As you know, Columbia College's new buildings are on a plateau a number of feet above the general level of the city; and on the eastern side there is a wall of rocks, which seems to go down almost a precipice nearly 200 feet to the level of the street below. Advantage is taken of this situation to make one of the beautiful parklets in which New York may be said to glory. From the street level to the edge of the plateau is a system of graded inclines and stairways, by which the climb is made an easy matter. From the parapet which surrounds the cliff at this level, one can see far and wide over the roofs; and a sweep is given in some directions to all the surrounding country. Some weeks ago, the wind came round suddenly to a little east of north, blowing a smart breeze, and quite cold—indeed, the thermometer fell so low that ice formed in the open. It chanced that this same evening I was detained down town, and did not go to my room until after midnight; and, as I usually do, when I reached the top of the staircase, I looked out over the sleeping city below. It is always a beautiful sight, and one to be remembered; but this time I saw something wonderful. The cold air brought by the wind was spread out a few hundred feet above me upon the warmer air made by the myriad fires below, and at their line of jointure could be seen the city inverted—the streets showing as lines of lights above, as they did below. The phenomenon may have been in existence a long time before I saw it; and it lasted long enough afterwards to give time for some interesting observations. One could distinguish the arc lights from the gas-mantle lights very distinctly; but while the reflection of both was bright, the mantles seemed by far the most distinct. Then, also, one could see in the reflection the East River, and both its fronts and part of the town on the other side, which was out of sight directly; and in this, while the mantles were points of light, the arcs only made the darkness more distinctly to be seen. But the most remarkable phenomenon was the suggestion of the lines of the buildings when they chanced to be illuminated by the mantles, and also to be white, or at least light. Most of the streets were reflected only as dots of light in rows; but some of them were distinctly lines for blocks at a time. I have seen many curious instances of mirage; but I know of none more surprising than this. I believe that, had I had a differential photometer at hand, I could have determined the index of reflection of this layer of cloud, or rather condensed, and may be frozen, water between the hot air and the cold. I assure you that it was very beautiful.

The Buffalo Case.

As you may have seen in the daily paper, the city has won its suit in its case against the Gas Company on the meter-rental

cases. The appeal was made on an agreed statement; and the Court was called upon to decide an important question, which it has done strictly on previous decision, and on strict construction lines. The city claimed that the charge for meter-rent was not legal; and the Gas Company denied that they did charge for rent—claiming that they did make a charge for maintaining the meters. It was the same old story of a minimum charge for services rendered under a new guise. The Court in its opinion rehearsed all the facts, and decided that it was a charge for meter-rent, because the alleged service was charged for according to the size of the meter; and if it had been for inspection and the like, it would be for the same amount, independent of the size of the meter. The Court also could not find that the law was unconstitutional, and fined the Company $50 and costs. It is the opinion of lawyers I have questioned, that, in view of the facts, the action of the Gas Company in attempting to collect meter-rent was silly. But, on the other hand, a number of men have told me that, had the case been stated in another way, or had the charge been equal for all sizes of meters, a different result might have been reached. This, again, brings up the question of the minimum charge. I know that the Electric Light Company demand a fixed rental, and so much per ampere in excess of a certain amount. The question is important when the inspector goes to houses month after month and finds no gas burned; and surely the minimum rate is equitable. In this case, it was simply the strict construction of a contract, and an obviously illegal act by the Gas Company, of which act it may be said: "No one can understand why they did it."

THE EFFECT OF THE COAL TAX ON EXPORTS.

By Free Trader.

Those who, in the spring of this year, ventured to protest against that most popular move of the Chancellor of the Exchequer in imposing 1s. export duty on coal, received scant attention. The coal trade had been making enormous profits, therefore let it contribute something to the war-impoverished treasury of the nation—that was one cry. Another and altogether contradictory one was: The foreigner will have to pay the duty; the foreigner is pro-Boer; to make him contribute to the cost of the war is a splendid idea. Everybody used different and self-destructive arguments; but the one prevailing idea was that somebody else was going to pay, that it would serve that somebody else right, and that political economy was all "stuff and nonsense."

The writer of the Editorial in the "Journal" at the time, took the view that the foreigner would pay, and sought to put political economists on the horns of a dilemma by setting the import duty on sugar against the export duty on coal; remarking that the arguments of the scholastic economists as to who would bear those duties—producer or consumer—would in each case counteract one another. "If the consumer eventually pays the tax upon sugar, so he will also in regard to coal"—a statement that ignores the difference between an import duty which places the exporting producers from all countries on the same level, and an export duty which acts at the port of delivery as a differential import duty laid upon the imports from one country only.

My present purpose is, however, not to discuss abstract economics (a reference to the article in question occasioned the foregoing comment), but to call attention to one or two concrete facts. The writer of the Editorial referred to (April 23 last) said: "It is all nonsense to pretend that the difference in value between English and any description of European coal is so small that the imposition of 1s. a ton duty on the former will turn the scale in favour of the latter. *It would need 10s a ton to do that.* Probably English gas and steam coal would bear a 5s. duty without any difficulty." The italics are mine. Against this expression of opinion, I want to set some remarks addressed to the "Glasgow Herald" recently by Mr. H. W. Heidmann, one of the principal coal importers of Hamburg, who has a thorough knowledge of the subject. The following is a summary of his letter, which was written to refute the statement that the duty has not affected the British export trade.

In considering this question, one has to distinguish between countries that are either coal producers or can conveniently import coal from other quarters than England, and those that are practically bound to buy English coal. It is in the case of our trade with the former that the duty hampers and restricts business; and Hamburg is a leading instance. The imports of coal into Hamburg last year amounted, roughly, to 4,600,000 tons, of which 3,000,000 tons came from Great Britain, and 1,600,000 tons from the collieries of the Westphalian Syndicate. The imports from America only equalled some 5000 tons. In the first ten months of this year, the imports from this country have decreased by 187,784 tons, while those from Westphalia have increased by 114,417 tons. American imports have also shown a substantial increase.

This, of course, is a comparatively small transfer of business—though equal to 4 per cent. on the total for 1900; but it must be remembered that it only represents the effect of the duty upon daily sales and contracts made since the end of April—contracts completed before Budget-night being exempt until the end of this year. "Further large contracts that expired lately, and also many of those that run out with the end of the year, have gone from the hands of the importers of English coal into those of the Westphalian Syndicate and the Silesian coal masters."

The coal imported into Hamburg is not all consumed there; a large proportion being barged to neighbouring places on the Elbe and its tributaries, or carried by rail to the surrounding towns. For the supply to these places, coal from Great Britain, Westphalia, Silesia, Saxony, Bohemia, and the United States is in the market. If our loading and unloading appliances were as complete, and our railway rates as low, as those in the States, American coal ought not to have a chance; but under existing conditions, and with freights so low, it is making its appearance. "At the present time, I have an offer lying before me for coal which, according to analyses, is equal to best Welsh smokeless, and does not cost more than 11s. 6d. f.o.b. This means that Welsh steam coal for the moment is practically excluded from the German market."

In regard to Bohemian coal, this competes with British in the industrial centres situated on the Elbe further up than Hamburg. In normal times, Magdeburg (about 120 miles above Hamburg) is the place where the two kinds of coal are in closest competition. Last year, when coal was so scarce in Germany, English coal was sold in large quantities in Dresden, nearly twice as far from Hamburg as Magdeburg. Silesian coal competes in Berlin and in Brandenburg province against English coal imported *vid* Hamburg. "A difference of *a penny or two* very often decides whether a large contract is going one way or another."

In Hamburg itself, the struggle is between British and Westphalian coals; the hottest wrangling going on in normal times for every big contract. The profit made per ton by the importer is usually small; contracts being sometimes booked for English coal at no profit at all, in order that the importer may run regular boats. It must be admitted, says Mr. Heidmann, "that anyone knowing the Hamburg coal trade must consider it utter folly to say that, under such conditions, a difference of 1s., or even 2s., per ton would have no effect on the import of British coal into Hamburg. What is said about the reduced consumption of coal this year does not apply to Hamburg. . . . The deficiency of coal imported into Hamburg is not the result of smaller consumption; but it is caused by the fact that Saxony, Bohemia, and Silesia, that do not appear with their produce in the German import list, have pushed down English competitors further towards the mouth of the river." So much for, "it would need 10s. a ton to do that."

The mistake people made was to imagine that, because a rise of 10s. per ton in price last year did not check the export of coal, therefore a tax of (say) 5s. would not do so; ignoring the fact that it was in large measure the extraordinary scarceness of coal on the Continent, and the consequent abnormal demand upon English collieries, that sent the price up 10s. per ton. If the position of trade and the supply of coal on the Continent had been normal, an increase of 5s. in the price of English coal would have reduced our exports enormously. In Germany, owing to the flourishing condition and rapid expansion of the iron and steel trades, and to the strike of Austrian miners, coal was in great demand last year. Now trade is seriously depressed; the iron and steel works that are not closed are all on short time; while fresh coal pits have been opened. So that German coal producers are doing all they can to find fresh markets or improve their position in the old. Prices have been reduced, yet the Westphalian Syndicate are obliged to curtail their output. Therefore "it is quite evident that in Hamburg, just as in Bremen and the Dutch ports, the consumer will not pay the English coal tax. On the contrary, the English coalmasters will have to reduce their prices by the 1s., so as to compete with Westphalia successfully."

To those people who have asserted that the quality of German coal is not such as to enable it to compete with English, Mr. Heidmann says: "Westphalia produces an exceedingly good soft coal, that has taken the place of Welsh coal, formerly imported here on a large scale. For bunker purposes, Welsh coal is practically not used here now. They further have a great choice of first-class hard flaming coal. . . . In Silesia . . . their hard coal competes favourably with very best English sorts. In fact, only very best Barnsley hards are considered equal to the good Silesian brands; and the latter have the advantage that they have to suffer less transhipment (which means less breakage) than the English coal."

From all this, the conclusion is drawn—and it is difficult to see how it is to be avoided—that, "under normal conditions, the 1s. per ton coal tax will strongly handicap the British coalmasters, and surely greatly reduce the import of English coal into Hamburg." These facts are of interest to those who thought political economy was worthy of consideration, and to those who thought it good to decry that science. It has been, I know, the fashion of late years to sneer at economics; but now that all the loose thinking that has taken the place of a careful consideration of the fundamental principles of social and political economy is bearing its fruit in the extension of municipal trading, the spread of communistic ideas, and a growth of "ca'cannyism" among the working classes and their leaders, perhaps the "dismal science" will come by its own again.

Sir J. Laing, the well-known Sunderland shipbuilder, whose death occurred at his Northumberland residence, Etal Manor, last Sunday, within a few days of completing his 79th year, was a Director of the Sunderland Gas Company and the Sunderland and South Shields Water Company.

TECHNICAL RECORD.

AMERICAN GASLIGHT ASSOCIATION.

Annual Meeting at Boston.

(*Concluded from p.* 1527).

Mr. F. Littlehales, of Syracuse (N.Y.), read a paper on "Retort-Ovens as Producers of Illuminating Gas." Commenting on the changes brought about by time, he mentioned that ovens or large retorts were extensively used in Scotland and elsewhere many years ago. Their chief merit was durability; and their chief defect, a high fuel account. Water gas had a similar history. Brought forward in 1850 by the Messrs. Kirkham, it lay dormant for 25 years or more, until the genius of Mr. S. C. Lowe, and the discovery of mineral oil, put it on a commercial basis. Ovens had been used for the production of coke longer than retorts for the manufacture of gas; but the term "coke-oven" should be rejected in favour of "gas-oven," because the oven was simply a retort on a large scale. Attempts to recover the gases from coke-ovens had been made over and over again, but for years proved unsuccessful. In 1856, Knab erected, in France, a group of coke-ovens that might be called the parent of the modern gas-oven. They were 23 ft. long, 6ft. 3 in. high, and 3 ft. 3 in. wide. The chief difficulty was want of knowledge of the proper proportions to be adopted in regard to the quality of the coal to be treated. This was subsequently improved upon by Simon and Carvés; and this formed the model for subsequent work. The first ovens on the principle known as the Semet-Solvay were constructed by M. Semet, in Belgium, in 1882. Some years ago, it was predicted that, if gas was entirely superseded; coal would have to be distilled for the sake of the other products. This was now fulfilled; for there were to-day in existence ovens where the gas was absolutely wasted, and the coke, tar, and ammonia made the business a commercial success. If the gas could be made for nothing, it could be sold cheaper than most gas companies could afford to sell it. This, and the fact that it was now proved that gas could be conveyed long distances at high pressure, would have a considerable effect on the future of the gas industry. Dr. Siemens had predicted that in large cities solid fuel would become a thing of the past, and the gas-oven was a great stride in that direction. The gas-oven would turn out a coke equal to the best beehive foundry coke; and in certain places where there was a large demand for metallurgical coke, the gas was allowed to burn to waste. This gas could, at a very small expense, be made equal to that sent out from the gas-works. There were many localities where the demand for coke was ten times as much as could be produced at the local gas-works, apart from the objection that gas coke was too soft for foundry use; so the coke-oven could be profitably worked from the standpoint of residuals alone. He exhibited a table showing the coal used, and coke produced, on this system in the States during the year 1899 (extracted from an official return), from which it appeared that about 30 million tons of coal were used to make 20 million tons of coke; and nearly 50,000 ovens were in actual use and 4000 in process of building. Of this quantity, only 5 per cent. was carbonized in the products ovens; the remainder of the gas, tar, and ammonia absolutely going to waste. The author went into figures at some length to show that this waste was four or five times the *per capita* consumption of coal or water gas. The money value of it was approximately £1,600,000 for gas; a similar sum for ammonia; and £640,000 for tar. The increase in coke making in the States went on at the rate of 1200 ovens, or a million tons of coal per annum; so that this waste was rapidly increasing. When this vast stream of waste was converted, as it assuredly would be, into a stream of profit, the material aspect of gas affairs would be altered. As an example of the possibilities of extension in coke business, only recently the Erie Railroad Company had abolished the use of soft coal on passenger trains; and it might safely be predicted that others would follow. It had been shown that, on coke considerations alone, the gas-oven would displace the old beehive type, because the yield of coke was much larger, a gas-oven producing in 21 hours as much as the beehive oven could in 72 hours; and to-day it was a great anomaly to find this great progressive country lagging so far behind others by sticking to the beehive oven. But as these ovens wore out, the advantages of the gas-oven were not likely to be overlooked. Attention was next directed to the smoke abatement movement, and the demand for a smokeless fuel in our large cities. It was shown, by means of a table, that the constitution of gas from gas-ovens was similar to that supplied by the principal gas companies. It consisted of 50 per cent. hydrogen, 33 per cent. methane, 6 per cent. carbonic oxide, 3 per cent. illuminants, and 8 per cent. nitrogen, oxygen, carbonic acid, &c. One great advantage of the gas-oven as compared with the retort was that it permitted a simple and effective method of separating the gases at different periods of distillation. The author went on to show that, whereas the cost of carbonizing wages in England, according to "Field's Analysis," was 2s. 10d., and that in American gas-works 3s. 6d., the cost at the gas-ovens was only 10d. per ton of coal. He argued that, even in works of moderate size, it would be possible, by adopting the gas-oven, to turn out gas at prices with which the retort system could not compete. The gas-oven would yield 72 per cent. of coke, as against 66 per cent. with the retort, and would enable low-class coals to be used that were not considered suitable for the retorts. It was a mistake to assume that gas was necessarily the most valuable product of the coal. That was a matter of condition and locality. We could not remove towns and cities to the centres of coke production, but he saw no reason why coke making should not be conducted at points where the bye-products could be readily marketed.

Discussion being invited, Mr. Atwater remarked that a demand for hard coke at good prices was a necessary feature to the success of the gas-oven; and this limited the appliance to a very small area outside of the furnace coke precincts. There were comparatively few localities for gas-ovens, where their full gas capacity would find a satisfactory outlet. But with the introduction of coke as a substitute for soft coal in railroads, industrial establishments, and for domestic use, the gas-oven might justify its existence in a town that would take the surplus gas from at least fifty such ovens. The success of the Everett (Mass.) works in disposing of 1200 tons of coke a day, and the extension of the system elsewhere, was not overlooked. Mr. Egner said the author put the carbonizing wages at 10d. per ton for the gas-oven, but at 3s. 6d. per ton for the retort. Using machine stoking on horizontal retorts, the cost could be brought down to 10d. per ton; and with inclined retorts, it would be less than 10d. Mr. A. S. Miller said he understood that the surplus gas from the retort-oven was about 4000 cubic feet per ton. Valuing this at 1s. 8d. per 1000 cubic feet in the holder, there was only 6s. 8d. per ton available for extra carriage on coal and coke. According to Mr. Atwater, the minimum consumption to make the gas-oven a success should be 1,200,000 cubic feet per day. How many companies in the States could sell this quantity, even if they deducted the cost in the holder from the present selling price? Mr. Addicks thought that the gas-oven could do a business on a coke basis only. But when they undertook to supply gas, they would have to consider the exigencies of variations in the demand of the gas department; and he thought some auxiliary works would be necessary to keep up a proper supply of gas. The use of inferior coal would increase the cost of purification. He also asked for some details as to how the estimate of 4000 cubic feet of surplus gas per ton of coal was arrived at, and whether it was a constant, independent of the quality of the coke used. He would also like information as to the effect of the substitution of gas-ovens for retorts on the residuals market. What would be the effect as regarded the quantity of coke, tar, and ammonia put on the market? And what would be the effect on the prices obtainable? Mr. Nettleton remarked that the Everett people only claimed to run a coke-works, and that the value of the other residuals in order was tar, ammonia, and gas. The success of the change turned upon the prices obtainable for the coke and for the other residuals. Mr. Searle inquired for further particulars as to the smallest scale on which the gas-ovens could be profitably worked. Mr. Greenough was quite prepared to adopt gas-ovens or any other modern improvement; but he did not think that the author had proved his case. Taking the figures given, and comparing with those of the gas companies, the balance was not in favour of the gas-oven. Before assenting to the statement that the gas-oven was the future method of gas making, he wanted some evidence of successful working, of maintaining of the value of the stock, and of earning dividends. The light retort coke was the better for domestic use, and oven coke would not compete with it on those lines. The gas-ovens were all very well for particular purposes; but it had not been proved that any gas company about to extend would do well to adopt the system.

Mr. Littlehales, in replying, expressed a belief that the gas-oven could be made a success on a much smaller scale than some appeared to suppose. He had approached the method as being prepared to earn the best possible return on his capital, by this or any other method that offered. At least as much ammonia was obtained from the oven as from the retort, although possibly not so much tar; but he had purposely understated the yields all round in the paper, so as to put comparisons on a safe basis for the oven side of the question. There was plenty of evidence that gas could be conveyed a distance of several miles without loss of quality. As regarded the cost of purification, it would not be affected by substituting the oven for the retort; and it would be the same by either process from any given description of coal. It had been suggested that auxiliary gas plant would be indispensable; but, as a matter of fact, the oven system had more elasticity than might be supposed. The ovens could be heated by producer gas or by the surplus from their own production, as required. As to a slump in ammonia or tar, there was considerable demand for ammonia for cold storage and other purposes; while tar was largely used for making macadam roads. The gas-oven coke was better than that from the beehive oven.

A paper on the "Fuel Value of Residuals" was read by Mr. Chas. F. Prichard, of Lynn (Mass.), who referred to the difficulty, in disposing of residuals, of keeping clear of accumulations of stock or unduly low prices. During the last few years, coke had not realized its fair fuel value, coal tar only fetched half its value as a fuel, while water-gas tar, coke breeze, &c., had been thrown away. Yet there existed a demand for fuel at the current values of steam coal that was unlimited. His present object was to give ultimate analyses of residuals having fuel values, the value as indicated by those analyses, the fuel values as tested by the calorimeter, and by practical working tests. Users of steam really

wanted to purchase evaporative results; and to compete in the open market, they must be prepared to offer a fuel that would do a given amount of work for a given money value. As a fair average example of the composition of bituminous coal, he quoted from Gill's "Gas and Fuel Analysis" the following: Carbon 80·5 per cent., hydrogen 4·9 per cent., oxygen 5·4 per cent., ash 5·8 per cent., and nitrogen, sulphur, moisture, &c., 3·4 per cent. According to Dulong's formula, as slightly modified by the American Society of Mechanical Engineers, this gave 14,385 B.T.U. per pound of coal or a theoretical evaporative value of 14·8 lbs. of water from 212°. The average current price was 15s. 7½d. per ton of 2000 lbs. In actual daily working on the boilers which were used for the practical tests, the efficiency was 9·8 lbs. of water from 212° per pound of coal. Any residual could be valued by comparing its evaporative efficiency with that of the coal. Coke had been prejudiced by an impression that it proved injurious to the boilers, and by the fact that published results were much too low. A sample of coke from a standard gas coal gave a percentage of 86·75 carbon, 3·38 volatile, 8·75 ash, and 1·12 moisture. According to this analysis, the fuel value should be 13,341 B.T.U., or 13·8 lbs. of water from 212° per lb. A calorimeter test of the sample gave 13·47 lbs.; and this was so near the value of coal, that the question at once arose why coke had secured such a poor rating—some authorities only giving it a value of 6 to 7 lbs. His first experiments showed an inferiority of 10 to 15 per cent. as compared with coal; but it was observed that this was due to the thinness of the fire, as compared with the size of the coke and consequent admission of an excess of air. To remedy this, he constructed a furnace having a depth of 2½ to 3 feet of fuel, with the air supply above the fuel by means of hollow brick walls. One side of the grate was fired at a time, and the furnace clinkered once in twenty-four hours. With this furnace, the results, as shown by a table he produced covering several years working, were as good as with coal. The fuel value of coke to him was therefore the same as the coal—viz., 15s. 7½d. per ton. An analysis of breeze gave carbon 77·2 per cent., volatile 6·4 per cent., ash 15 per cent., and moisture 1·4 per cent., which corresponded to an efficiency of 12·9 lbs. from 212°; and a calorimeter test gave 12·7 lbs. For various practical reasons, it was difficult to burn breeze completely in practice; and the best results were secured by mixing it with coal. Several tons of it supplied to local works were said to be equal to anthracite dust at 8s. to 9s. per ton. In a test of a fuel composed of 4 parts coke to 1 of breeze, he obtained for the breeze a duty of 5·3 lbs.; and a mixture of coal and breeze gave 6·5 to 7 lbs. for the breeze. At this rate, the value of breeze would be 10s. 4d. per ton. An analysis of coal tar showed 89·2 per cent. of carbon, 5 per cent. of hydrogen, and 5·8 per cent. of sulphur, nitrogen, &c., which gave 15,781 B.T.U. and 16·4 lbs. evaporative power. A calorimeter test indicated 15,708 B.T.U. A practical test was made with a steam-jet burner in the deep furnace used for the coke; and the average duty obtained was 11·9 lbs. water. For several reasons this experiment was not a success; and he believed it would be quite possible to obtain a duty of 14 lbs. in practice. But at 11·9 lbs. the full value of the tar was 19s. per ton. An analysis of water-gas tar showed 92·7 per cent. of carbon, 6·1 per cent. of hydrogen, and 1·2 per cent. of sulphur, nitrogen, &c., corresponding to 17,296 B.T.U., or an evaporative duty of 17·9 lbs. of water. A test with the calorimeter gave 17,193 B.T.U., or 17·8 lbs. of water. It was more easy to use under the boilers than the coal-gas tar; and a test, extending over several days, gave an average of 14·9 lbs. of water. The value of water-gas tar was therefore £1 4s. per ton. Various authorities stated the value of petroleum as a fuel at 18,000 to 21,000 B.T.U., equivalent to 18·5 to 21·5 lbs. of water, and the practical value at 12 to 15 lbs. From these results, it appeared that the experiments with the water-gas tar were very successful. The figures given established a ratio for the values of various kinds of fuel based upon the current value of bituminous coal.

Mr. Sherman commenced the discussion by stating that for several years he had used oil-gas tar as a fuel in benches of sixes. The furnaces consumed 66 bushels of coke, or 150 gallons of tar; and putting the coke at 3d. per bushel, the fuel value of the tar would be 1¼d. per gallon. He used a steam-atomizer, and found no trouble in keeping it going. A coke fire was used at the start. Mr. A. S. Miller had tried some similar experiments; and the figures given showed that his results were not far wrong. Mr. Donahue asked if there was any trouble from smoke when burning low. Mr. Egner said that a gallon of tar was equal in fuel value to ⅔ bushel of coke. Mr. Prichard, in replying, said that the breeze used was refuse from the coke yard. The tar burned with a clear, white flame; and there was no trouble from smoke. Water-gas tar ran easily; but coal-gas tar was thicker, and sometimes gave a little trouble. The use of liquids relieved the firemen of a great deal of work.

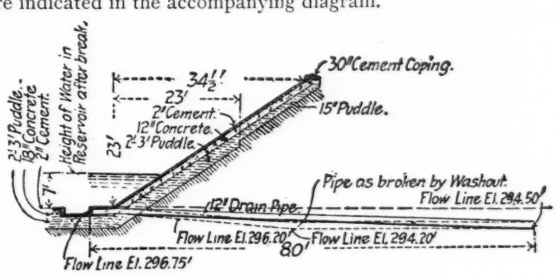
In the course of the discussion on the contents of the Question Box, it transpired that, in the experience of two or three members, the gas-lights in one particular street or area had been extinguished by sudden barometric depression during storms. In reply to an inquiry as to whether it was good practice to let a Lowe water-gas set stand idle for twenty-four hours per week, in order to burn out the carbon accumulated on the checker bricks, Mr. Nute said that, if properly run, the superheater would go for three months without requiring burning out. Mr. Norris thought that the set should be cleaned whenever the necessity for it was indicated by a falling off in make. It could be postponed by burning one for an hour or two; but such a practice was open to the objection that it disarranged the heats in the fixing chambers, and some time was required to get into normal condition again. Mr. Morrison said that whether the cleaning was required once a week or once in six months was a matter that depended on the working. In reference to another query, Mr. Searle thought that the centre support for incandescent mantles had not been so successful in America as elsewhere, because the relatively high candle-power led to a deposition of carbon that in time interfered with proper combustion. As to the best ways of dealing with the small unprofitable consumer, Mr. A. E. Forstall believed in putting on a high meter rent sufficient to cover the cost of keeping the account. In response to a request for information as to the use of post-cards for gas bills, the matter being printed on the back, Mr. J. D. M'Ilhenny said he sent out several thousand accounts in this way, and would continue to do so; and Mr. Clabaugh said that, in his town, the Water Company had adopted the plan.

The report of the Committee on final resolutions, which included votes of thanks to the Committee of arrangements, the President, the Secretary, and the readers of papers, was then carried with applause; and the meeting closed.

FAILURE OF AN AMERICAN RESERVOIR.

About the middle of last month, a reservoir at East Liverpool, Ohio, failed while it was being filled for the first time. The circumstances were very unusual; and this led a gentleman familiar with the structural details to send to the "Engineering Record" a few facts concerning the accident. The following particulars are taken from that publication.

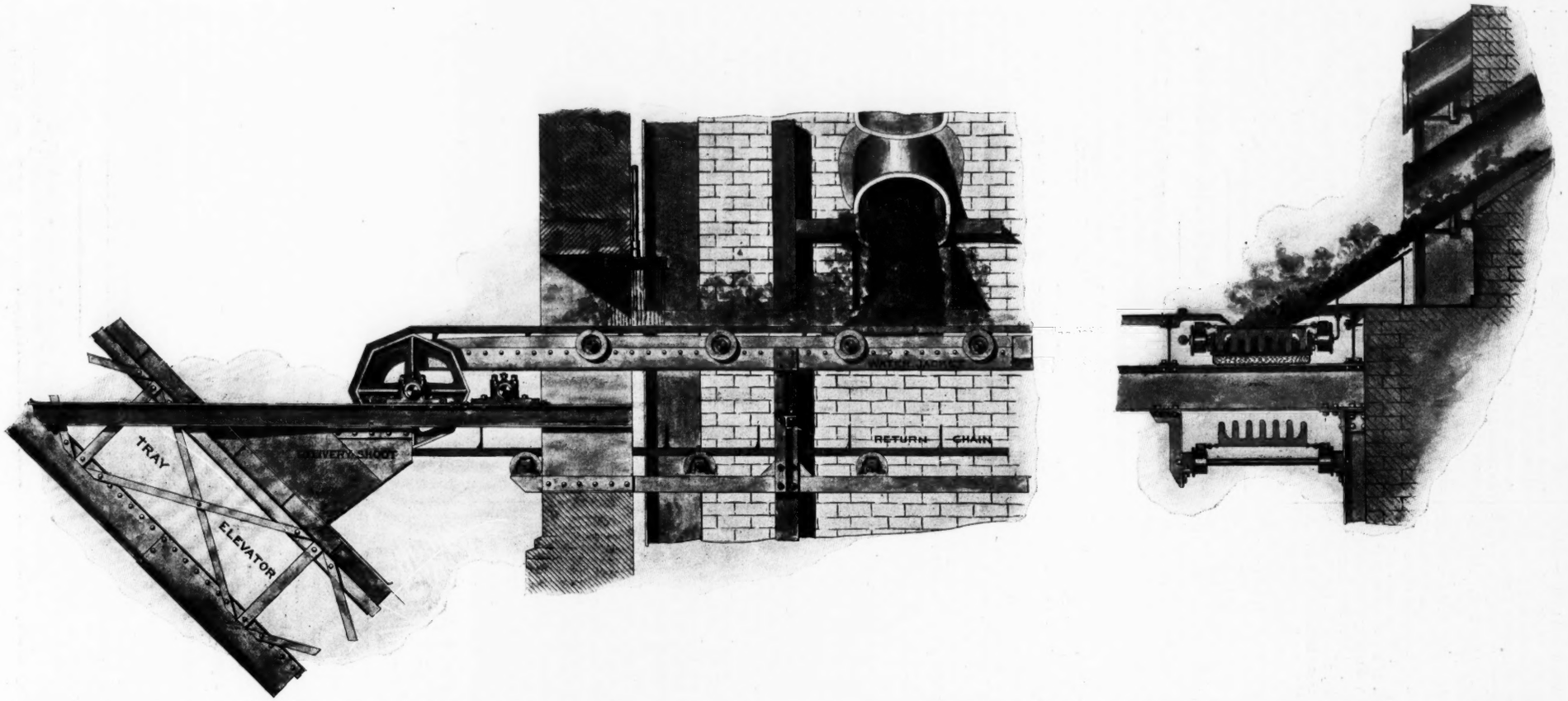
The reservoir is located about 20 feet from the edge of a bluff which slopes downward at an angle of about 45°. It is approximately rectangular in plan, about 275 feet long, 146 feet wide on the coping, and 23 feet deep. Its length is parallel to the edge of the bluff, and just to the south of it; and only 16 feet farther along that edge, is an old basin about 96 feet by 105 feet, also 23 feet deep. The new reservoir was almost entirely in excavation, and was lined on the bottom and sides with from 15 to 18 inches of good puddle, well pugged and rammed with wide wooden rammers. This puddle was placed in three layers, which, owing to the frequent rains at the time the work was in progress, were compacted into one mass. The clay was then covered with concrete, 18 inches thick on the bottom, and from 9 to 15 inches thick on the slopes, rammed until it was compact. The work was then allowed from three to six weeks to harden, while the connecting-pipes were being laid and other parts of the work brought to a finish. The supply main ran along the top of the bluff for the whole length of the reservoir, and was buried about 7 ft. 6 in. deep on a line midway between the coping and the edge of the bluff. It ended at an inlet at one of the corners farthest from the old reservoir. The outlet was at the corner diagonally opposite the inlet, while the drain-pipe was at the south-east corner, nearest the bluff and the old reservoir. The details of the basin at the place where the drain-pipe passes off are indicated in the accompanying diagram.



Section of Bank at Drain.

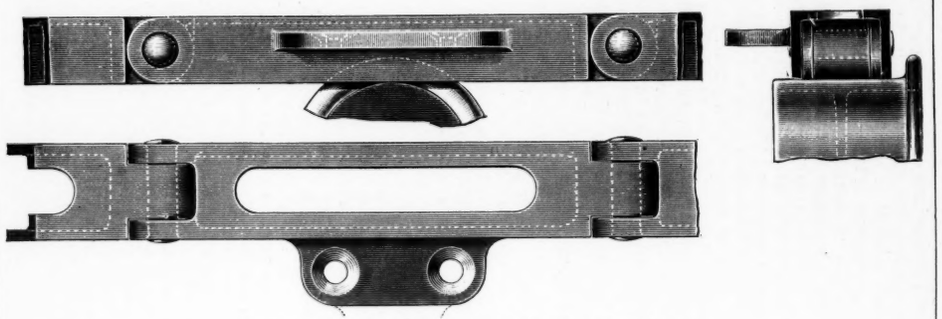
The last work on the reservoir was plastering a skin coat of cement, 2 inches thick, over the entire concrete surface. Owing to the time taken in doing this, the corner at which the break occurred had been in position at least two months. The reservoir was gradually filled until the surface of the water stood about 17 ft. 5 in. above the bottom. When this elevation was reached, water was observed to be issuing from the hill below the reservoir, and ten minutes later the corner where the drain-pipe was laid gave way, and the water rushed down the bluff, causing considerable damage. The axis of the crevice in the bank corresponded with the diagonal through the corner and with the direction of the drain-pipe. The slope lining was left in position from the bottom up to an elevation of about 7 feet, at which height a rectangular break, about 11 ft. 6 in. wide, was washed through the lining. As the water rushed along, it eroded a much larger trench, until, at a distance of about 40 feet from the toe of the reservoir lining, the channel was about 35 feet wide and 24 feet deep. The cause of the accident is not definitely known.

We learn that Mr. J. H. Bomford, has been appointed Secretary of the Alcester Water Company, in the place of Mr. W. M. Holland, who has resigned.



DEMPSTER AND BROADHEAD'S COKE-CONVEYOR.

In the article which appeared last week on the new gas plant at Heckmondwike, the hot-coke conveyor—the patent of Messrs. R. Dempster and Sons, of Elland, and Mr. J. W. Broadhead—received special notice, and its general characteristics were pointed out. We have since received from Messrs. Dempster a tracing illustrating the conveyor as in use at Heckmondwike, with the exception that the tray elevator as shown is in line with the hot-coke conveyor; whereas at Heckmondwike it is twisted round at right angles to the hot-coke conveyor. However, the drawing illustrates the way the hot coke is put on to the uptake of the tray elevator. Where the site admits of the arrangement, the conveyor is made to act as an elevator by inclining it upwards as soon as it leaves the retort-house. The small illustration shows the formation of the chain. It will be seen that each segment of links is alike and interchangeable, with the exception that some have a lug cast on, to which the rakes are attached. Both the rake and the chain are of either malleable iron or cast steel. The rollers on which the chain runs are fixed on pins which are of case-hardened steel. On the top bar of the rake near the end, but inside the trough, are cast small projections, so as to prevent water running over on to the chain, which (as was mentioned last week) is situated outside the trough. The rollers and spindles are lubricated by



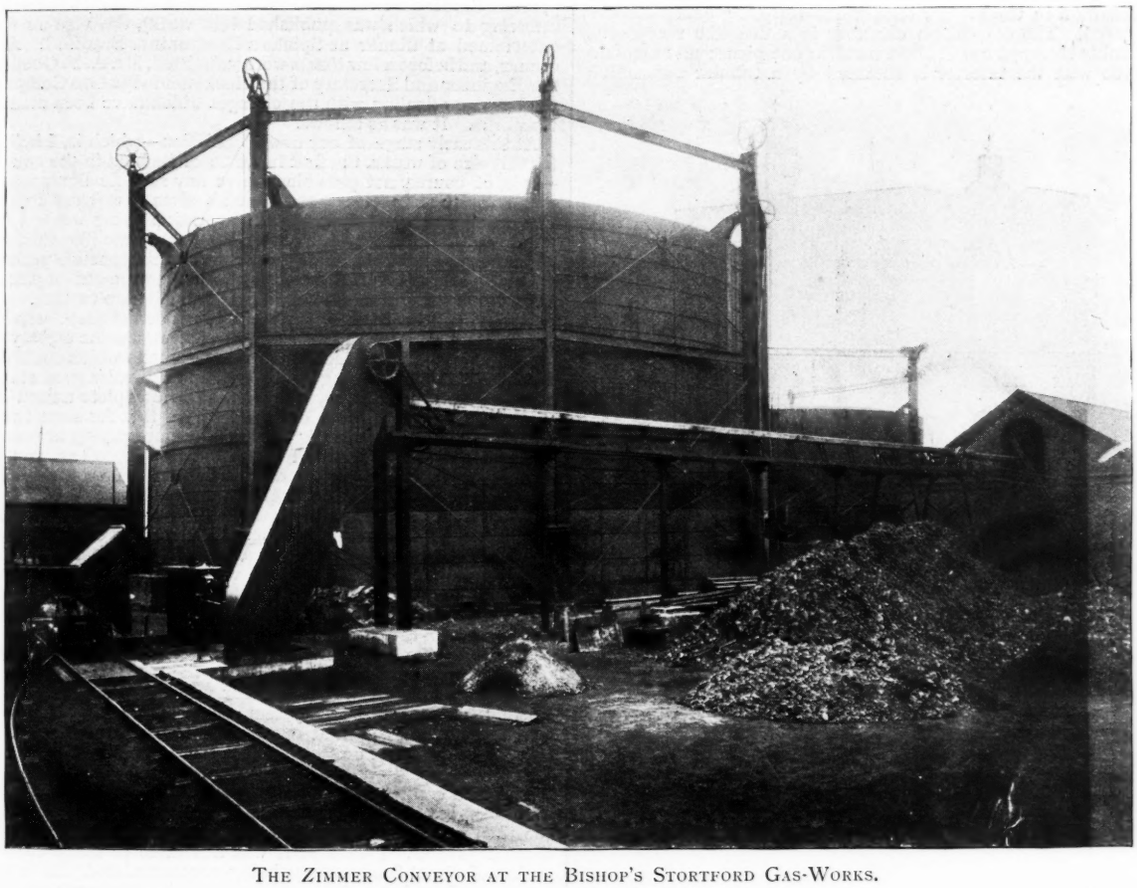
Dempster's Malleable-Iron Conveyor Chain.

means of Stauffer's lubricators and grease cups. Access is gained to those next the bench by means of hand-holes in the floor-plates, so that the lubricators can be easily reached from the ground floor. Where desired, the bottom of the trough can be fitted with a loose renewable bottom. The conveyor return may be either above or below the stage-floor, as preferred. The action of the conveyor in respect of smoothness and noiseless operation was also referred to in the Heckmondwike article. There is one point in the large illustration to which attention may be directed. It will be seen that the trough is illustrated with a water-jacket on the underside—Messrs. Dempster and Sons having recently taken out a provisional patent for water-jacketing either the bottom or the bottom and sides of hot-coke conveyors, so as to prevent the hot coke warping the coke-trough. These additional notes on the conveyor should be read in conjunction with the description on p. 1525 last week.

ZIMMER CONVEYOR AT BISHOP'S STORTFORD.

The expense and inconvenience of getting coal from the railway siding to the works, recently induced the Directors of the Bishop's Stortford Gas Company to instruct their Engineer and Manager (Mr. J. W. Portass) to adopt a mechanical coal-handling plant; and, after full consideration, he declared in favour of the Zimmer conveyor. The position of the works not admitting of the railway waggons being run into the yard, a system of light tram-lines and tip-waggons has been adopted. As shown by the illustration, these run into the yard, and are emptied into the hopper of the elevator. The tram-lines were furnished by Mr. Howard, of Bedford, while the conveyor and elevator were supplied by Mr. G. F. Zimmer, of 82, Mark Lane, London, E.C. The structural work and erection was executed by the Company's own workmen, under the supervision of Mr. Portass. We learn that the plant is working most satisfactorily, and delivering coal at the rate of 6 to 7 tons per hour; the cost of conveying it from the railway siding to the store at the works, on an average, being less than 4d. per ton.

Although the Zimmer conveyor is now well known, and at work in a large number of industrial establishments, it may not be out of place to give here a short description of the contrivance, which, it must be said, is exceedingly simple and ingenious. It consists of an open steel trough, to which is imparted an oscillating motion; the oscillations being not only backwards and forwards, but slightly up and down—the movement being caused by inclined spring legs. Any piece of coal deposited in the trough is pitched forward by an action similar (though in a mild form) to



The Zimmer Conveyor at the Bishop's Stortford Gas-Works.

that of a catapult. The trough slides back before the piece of coal has settled on the trough, which is again ready to give it another kick; and so the operation is continued, until the material arrives at its destination. The action is much more gentle than might be supposed from this description; and the material, it is stated, floats along in an easy moving and uniform stream. The trough can be made of any length, and to any necessary capacity for the work it has to perform. It can also be extended at any time without disturbing the driving gear. Furthermore, it can be driven from any point of its length; thereby enabling the driving power to be taken from any convenient source. We have the assurance of Mr. Zimmer that recent improvements permit of the erection of the conveyor in lofty buildings without fear of causing vibration to the structure. This is an interesting point to note, as the use of a conveyor which causes great vibration would not, by any means, be desirable in an inclined retort-house; nor, for such friable material as coke, would a violent transmission be regarded with general favour by gas engineers. But Mr. Zimmer is confident that, in respect of breeze, the conveyor will compare well with other forms of mechanical carriage. For the conveyance of coal for gas-works purposes, the possible objection referred to would not, of course, apply; but, on this point as to the transmission of coke, we should like the testimony of gas engineers who have had experience with the Zimmer. It may be remembered that this type of conveyor is in use at the Zurich Gas-Works, where there are 2000 feet at work. An installation has also been made at the Margate Gas-Works for both coal and coke; and there is a length in use at the Heckmondwike Gas-Works for purposes of coke distribution.

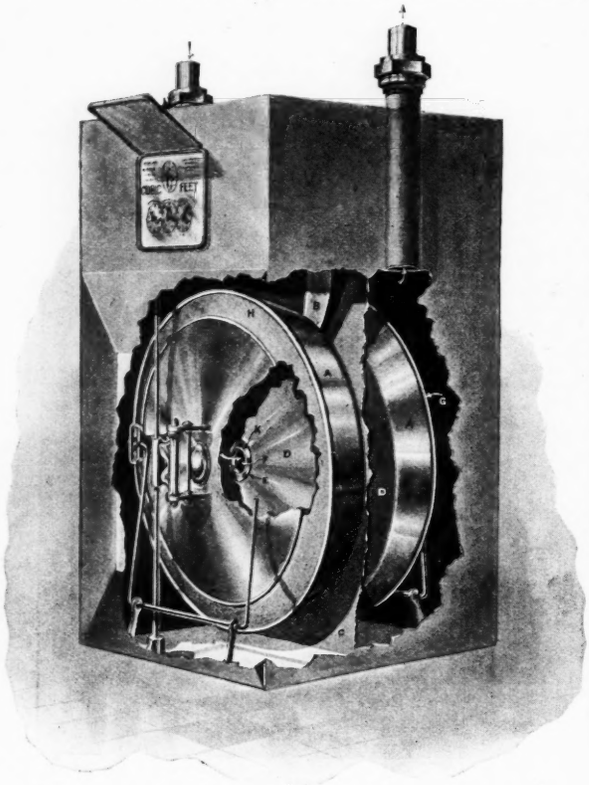
The conveyor at Bishop's Stortford is 145 feet long, and extends right across the yard, and about 60 feet into the coal-store. It is fitted with a number of outlets, so that the coal can be deposited at any point of the store. The store is filled right up to the conveyor trough, and the coal lays from this at its natural angle of repose; and more coal can be got into the store by trimming, should it be desirable. One of the reasons why the expense of coal handling under the circumstances of this particular case is so low, is the fact that the Zimmer conveyor requires very little power indeed.

We learn from Mr. Zimmer that he has made a number of important improvements in the conveyors, one of which is that he has succeeded in designing a conveyor with a reversible action, so that it can be used to transmit material in both directions. It has hitherto been a drawback to the conveyor that it could only be used to convey in one direction; and if material was to be moved in both directions, two conveyors standing side by side had to be used. This can now be done on the same conveyor; and the reversal of its direction of operation occupies but a few minutes.

SCHOFIELD'S PATENT DIAPHRAGMS FOR DRY GAS-METERS.

"I am of opinion that this invention is the most valuable and important improvement that has been introduced in the manufacture of dry gas-meters during the past thirty years; and its simplicity is such as to occasion surprise that it has not been thought of before." These are the words of Mr. Thomas Newbigging; and when such testimony—direct and free from equivocatory terms—of a man of his standing and experience in the gas profession comes before us, then the subject of that testimony commands our respectful consideration. The invention has already come under the notice of our readers, having been described in our "Register of Patents" in the "JOURNAL" for the 19th ult.; and those who may be interested by the present further reference to the matter (which is prompted by Mr. Newbigging's report) cannot do better than turn back, for particulars as to the actual construction, to the lettered illustration and description alluded to.

As already stated, the invention relates to the diaphragms of dry meters; and its main purpose is to do away with the old troubles arising from imperfect diaphragms. It accomplishes this by the construction of the diaphragm chambers in such a way as to enable their easy attachment to, and detachment from, the partition in the meter; testing and repairing being thereby facilitated. The diaphragm chamber is a dish-like receptacle, preferably stamped out of sheet metal in one piece; and communication with the interior is obtained by a tubular connection



A. Wall of Receptacle. B. Gas Passage. C. Partition. D. Bottom of Receptacle. E. Internally Threaded Ring. F. Externally Threaded Nozzle. G. Annular Groove. H. Flexible Diaphragm. K. Hole in Centre of D.

formed by a hole in the bottom of the dish. This connection is furnished with a nut to be screwed on to an externally threaded nozzle secured to the gas-passage. Leaving out the minor details, this and the accompanying engraving give an idea of the main feature of the improvement. It is quite obvious that this new form of construction is so simple that from the very simplicity advantages must arise which will give it a preferential claim in comparison with existing types of diaphragms. There is no doubt as to the novelty of the improvement, seeing that Mr. Newbigging remarks that it "occasions surprise that it has not been thought of before;" and, as to the advantages over present diaphragms, he sets them forth with a conciseness which forces them home point by point. He says: "(1) The diaphragms are cheaper to construct. (2) Less skilled labour is required. (3) They are better when constructed. (4) They ensure more accurate registration. (5) After-repairs are more easily effected." No comment is needed on any one of these features.

Another point which falls to the credit of the new invention is this—that hitherto the diaphragms of dry meters have been completed after being placed in position in the meter; and upon this Mr. Newbigging remarks: "The soldering of the diaphragms in position is an unsatisfactory operation, being awkward to perform, while the risk of damaging the leather of the diaphragm by scorching with the soldering-iron is very considerable. Schofield's diaphragms are a complete remedy for these disadvantages." Again, the diaphragms are finished and tested before being fixed; and absolute security is given against short-circuiting. The fixing, too, is such a simple operation that the cost is practically *nil*. Speaking of cost also reminds us that the machinery which would be required for making these diaphragms must be of an exceedingly simple character; and therefore low cost and speed of production will undoubtedly find a place among the several other advantages to which attention has been directed. With Mr. Newbigging's report before us, and after inspecting a meter fitted with the new diaphragm, we have not the slightest hesitation in speaking a good word for this simple but ingenious and valuable improvement, and complimenting Mr. Arthur Schofield, of Ashton-under-Lyne, upon being its inventor.

THE INCLINED RETORT AND COAL AND COKE PLANT AT HECKMONDWIKE.

After the inspection by gas engineers of the Manchester district of the new inclined retort installation and coal and coke plant at the Heckmondwike Gas-Works on the 6th inst. (an article referring to which was published last week), the visitors were entertained at dinner at Spinks's Restaurant, Bradford. After dinner, and before a few toasts were submitted, Mr. A. F. Goodson, the Engineer and Secretary of the Heckmondwike Gas Company, read a paper dealing with the changes which have been made at his works. It was as follows.

At this early stage of our new installation—which is, I believe, for this size of works, the first instance of its kind in the country—it is, of course, not possible to give any reliable figures as to results, or to state clearly the benefits already enjoyed from it; the inclined retorts at present in operation being worked conjointly with the horizontal ones. Still, at a time like this, with so many gas engineers holding onerous and responsible positions from all parts of England before me, it cannot be out of place to state our experience of its building and starting up to date.

The old retort-house, which has been demolished, was one which, from alterations I caused to be effected some eight years ago, gave first-class carbonizing results—results which could only have been obtained by a good setting, and by really good stokers attached to the manager, and working in complete unison and understanding with him. When I tell you that for some two or three years, with the same wages which we are paying at present, the cost of coal per ton carbonized did not exceed 2s., you will readily see that a revolution of this description was not lightly embarked upon by the Directors of the Company. We all know that dividends are either made or lost in the retort-house. The condition and management of the retort-house is of supreme and overwhelming importance to the prosperity and vital interests of all gas companies. Whenever I visit a gas-works, and meet a brother manager showing undisputed signs of his acquaintance with the interior of the retort-house, I know that the true interests of the concern are in capable and efficient hands.

However, the Heckmondwike retort-house being in a state of decay, and failing to comply with the growing demands for gas, it became imperative to either pull down and extend the existing beds on the old system, or else to take the bull by the horns and going in at one sweep—in spite of extra capital charges—for a plant up to, and even more than up to, date. My Directors decided—and, I think, very wisely—to adopt the latter plan. The contract for the work was let to Messrs. Dempster and Sons, Limited, on March 12; and the work of pulling down the then existing retort-bench and the retort-house commenced three days later. I thought it was advisable to insist on three arches of direct-fired settings being accommodated with a temporary roof, and remaining up in case of emergency; and only three arches of sloping retorts being put up to begin with.

The house was rebuilt to the same width as the old direct-fired house—viz., 60 feet; but the length was increased 16 ft. 6 in. The foundation stone of the new building was laid on April 13; the erection of the roof was commenced on June 15; and the building of the gas-producing portion itself was commenced on June 21. The first setting was completed and finished, and a fire put under it, on August 31, which allowed 58 days for drying. This could not have been done by any ordinary course of working; but the Contractors, acting on my instigation, adopted the system of night and day gangs, and also introduced electric incandescent lamps in the retort-house for the night shift to work by. It might be observed here that this was possibly a peculiar case where electricity scored amid the smoke and dust of the retort-house (one-half was still at full work) against the intensified or ordinary gas lighting, either of which, I think, would have been inapplicable in this instance. The second and third beds were completed within three weeks after the first one, and are now along with it in full work.

As soon as we have repaired some settings in No. 2 house—which, for obvious reasons, could not have been done before—the remaining three old beds in the sloper house will be pulled down, and the building of the other three arches commenced forthwith. The end of the bench now at work has been temporarily stayed by means of strong buckstays and horizontal bracing. The new

arches will be built up to this end wall; leaving openings through the main arch round the temporary end buckstays. Regenerators will be built up to the ground line in the two arches furthest away from the bed at work; and the empty arch adjoining the bench at work will be thoroughly stayed by means of horizontal props. Another staying of permanent end buckstays will be fixed at the outside end of the next three arches; the longitudinal tie-rods will be connected up to the ends of the existing main tie-rods by means of coupling boxes; and when the work has been thoroughly tied, the clips now on the temporary buckstays will be unbolted and removed (without in any way disturbing the tension of the main tie-rods), the buckstays will be drawn, and the holes in the main arches made good.

The coal-handling plant is of simple construction; and I am pleased to say it is working exceedingly well. Underneath the coal-hopper we have an arrangement fixed for giving a certain feed only to the elevator, so as to prevent the possibility of the buckets being overfed. This is done by means of a horizontal slide working backwards and forwards. The travel of this slide is regulated by an eccentric, which regulates the quantity of coal taken out of the hopper and put into the breaker.

As already stated, I can only give approximate figures regarding the working up to date. I make out at the present time that the cost of carbonizing per ton of coal, including inclined and horizontal retorts, works out at 19·51d., or 1s. 7½d.; and the cost per 1000 cubic feet 1·95d., or a fraction under 2d. This, of course, although a very low figure, taking the actual cost of carbonizing throughout the country, can still and will be greatly reduced when we are working nothing but slopers. I have tried, however, under the difficulties just mentioned, to arrive at a real estimate, so far as possible, of the cost per 1000 cubic feet made and per ton of coal carbonized by the slopers alone. I can get at the gas made by the horizontal retorts before the slopers were put into operation; and deducting this from the gas actually made at the present time, I do not think that I am far wrong, especially taking into account the fact that the retorts at the time were in very bad condition and have since then much deteriorated. I make out that the cost at the present time for slopers alone is 11·53d. per ton of coal carbonized, and 1·18d. per 1000 cubic feet of gas made. This includes the wages of stokers, boilermen, enginemen, labour in respect to elevator and coke-handling plant, and firemen—in fact, all that can be duly and properly charged to carbonizing account.

With regard to the coke-conveying plant which we have recently installed, it is entirely in its infancy; and at present I am not able to give you any real experience from its working. To my mind, the great question of conveyors is the problem of avoiding an excess of breeze. If this can be avoided, and the machinery be made to work smoothly, I think one of the most troublesome and irritating points of gas manufacture will have been overcome.

OPEN AND COVERED SERVICE RESERVOIRS.

At the Winter Meeting of the British Association of Water-Works Engineers on the 7th inst., the members proceeded with the consideration of Mr. W. Ingham's paper, read at the annual meeting, on the "Design, Construction, and Cost of Open and Covered Service Reservoirs," an abstract of which was published in the "Journal," for July 30 last. The time which had elapsed had given members an opportunity for studying the contribution, with the result that the discussion extended over the whole of the morning's sitting. Here we can only generally indicate the views of the speakers.

Mr. G. Mitchell (Warrington), in a written communication, referred to a statement by the author, that to place 2 feet of puddle behind a reservoir wall and then form the floor with 15 inches of concrete without puddle was bad engineering. He contended that this did not necessarily follow, as the walls of a reservoir were frequently formed of bricks, which were slightly porous, or concrete, which was usually slightly porous; and puddle behind such a wall would smother down any sweat from the inside of the reservoir. Moreover, the floor of a reservoir was usually placed on a comparatively unyielding stratum, and, besides being of considerable thickness, was carefully finished with a more or less water-tight coating of cement plaster to facilitate cleaning out. Hence the water-tightness of the floor would probably compare favourably with that of puddle-backed walls, seeing that these were surrounded with materials which were necessarily constantly changing in consistency and thrust, producing, especially with clay back, slight movements in the walls and minute cracks—concrete being especially liable to this, owing to the usually insufficient care bestowed on the joints between new and old concrete. He added that it was to be regretted that probably the most economical and interesting type of covered service reservoir—reinforced concrete—was not dealt with in the paper.

Professor Henry Robinson mentioned that some years ago he put into shape information with reference to the cost of covered reservoirs; and his experience was that £5 to £6 per 1000 gallons represented the cost under ordinary conditions. Recently he had finished a reservoir of a capacity of 300,000 gallons; and the cost was £5 10s. per 1000 gallons. However, he warned young engineers that, unless they had good information as to the geological formation, figures of this kind might be easily exceeded. He instanced a case in which the engineer assumed that the reservoir, because it was partly built on the side of a hill in the silurian formation, had been constructed on a good foundation of rock. But the strata had a dip on one side, which held up a large mass of rock that was slipping on a treacherous thin band of clay—sufficient to allow the overlying shales to slip forward on the removal of the previously supporting ground. The ultimate cost of that reservoir was much greater than the figures he had given. Replying to Mr. Priestley, he added that the reservoir, the construction of which cost from £5 to £6 per 1000 gallons was an arch one, made of concrete, with puddle, faced with a rendering of 1 to 1 sand and 2 parts cement. He referred to another reservoir in which there was a great deal of soakage; the floor being constructed of portland cement concrete, rendered with a layer of ½ to ½ cement and clean sand. There were evidences that the rendering in places was not so perfect as it should have been. An additional 3-inch surface—consisting of small clean granite siftings and chips, 1 to 1 of portland cement, and 1 of clean sharp sand—on the previous rendering made the soakage disappear. He suggested the use of the words "absolutely water-tight" in reservoir specifications, as in the case he had instanced the contractors might have contended that the reservoir was practically water-tight, and litigation might have resulted.

Mr. E. J. Silcock (Leeds), calling attention to the remark of the author that the inlet of a reservoir was preferably placed at the top, and his suggestion that it was always advisable to have an apron under the inlet, said he thought, as a rule, it would be found that if the inlet was placed at or near the bottom it was quite as convenient as if situated on the top. In this connection, a small dwarf wall, enclosing a space on the floor, which space would be filled with water, and so form a cushion, was the best protection that could be made to the floor at the inlet-pipe. He considered that a bye-pass, in almost every case, should be arranged, even if a reservoir was divided into two, so that the water could be diverted round the reservoir. He also thought it was always advisable to have a rendering on the inner face of concrete. In rendering, it was not so much the thickness of the material as the "elbow-grease" that was used in putting it on. It wanted to be well trowelled; and the face rendered with neat cement. The author found that brick piers for supporting the roofs of reservoirs could be constructed at less cost than concrete piers. He (Mr. Silcock) suggested the making of concrete blocks in lengths, which would give the necessary length in about three pieces. He believed they would be able to do this cheaper than brickwork. Iron columns in his experience worked out equally as cheaply as brick piers. He also remarked upon the impossibility of comparing costs without taking into consideration all the circumstances. At the same time, he thought the figure of £5 or £6 per 1000 gallons mentioned by Professor Robinson was rather high. He had constructed two reservoirs—one at £4 17s. 6d; and the other at £4 7s. 6d. But, of course, the price of materials current at the time the work was being carried out was an important factor in the ultimate cost. From his subsequent remarks, it appeared that it was his opinion that the walls of reservoirs being made vertical or nearly so was, in many cases, a mistake; and where the ground below admitted of it, he thought it better to take advantage of the natural slope of the ground, and put in a protection to that natural slope instead of trying to retain the material. He also commented upon the mistake of benching; and mentioned a case where a fracture took place at the point of the benching.

Mr. H. Ashton Hill (South Staffordshire Water Company) gave particulars of trouble that was encountered in constructing a covered reservoir over some old coal workings—the site being the only one available. Two seams of coal cropped up in the foundations, but apart from them the ground was strong clay. The coal was taken out, and the space filled in with concrete. Then in constructing the reservoir, they put in a thin layer of concrete all over; and then benched the puddle round the walls. They profited by their experience in that case; and he did not think he would follow the same course of construction again. When the water was put into the reservoir, it leaked; and the whole thing went down bodily about 2 inches, but fortunately fairly evenly. The thick walls cracked in one or two places—only slightly, but sufficient for water to run out. They then rendered the whole of the walls and the bottom, and succeeded in making the thing perfectly sound; and it had been so for the past two years. He mentioned this to emphasize the point as to the necessity of making the impervious material continuous down the side, under the bottom, and up the other side. He did not think it mattered much whether the inlet was at the top or the bottom. In the reservoir to which he had referred, he had an inlet at both top and bottom. Mr. Silcock had raised the point about water-tight concrete, and rendering the inside. Of course, he was referring to covered reservoirs, and not to the cement rendering of the insides of open reservoirs. [Mr. Silcock: I should say both.] He (Mr. Hill) had hesitated to render the insides of open reservoirs on account of damage to the rendering by frost. In a reservoir he had lately constructed, he had put a brickwork lining inside, then rendered the back of the lining, and then built up the concrete wall behind it. He did this because he did not consider the rendering suitable for an open reservoir. Referring to the covering of reservoirs, he also remarked upon the necessity of considering, in connection with the shape, the superficial area of cover required.

Mr. F. I. Bancroft (Hull), pointing out that it was stated in

the paper that a service reservoir was a "necessity" in most water-works schemes, said if the author would change the word "necessity" to "desirable," he would concur with him. He could not agree that it was a necessity, seeing that at the present time he was delivering 11 million gallons per day, sometimes more, to the city of Hull, without a gallon of service reservoir storage. He commented at length on the author's statement that, for pumping schemes, where the machinery was duplicated, a two-days' service reservoir supply was generally sufficient—producing a diagram and figures regarding the deliveries of water at Hull at different periods of the day, in order to show, supposing he desired to construct a reservoir, the size he would require, so as to equalize the discharge from the pumps, and to do all his pumping in two shifts of eight hours. In passing, he corroborated Mr. Ingham that the ratio of the maximum discharge to the minimum was 3 to 1. The figures quoted showed that, under the conditions of the day considered, 80 per cent. of the whole of the water would have gone direct from the wells to the district, and only 20 per cent. would have passed in and out of the reservoir. Working this out for the greatest supply to the district in any one day—11,566,000 gallons—he found that a reservoir of 3 million gallons would be sufficient to equalize the discharge from the pumps, working 16 hours per day, or if, on the other hand, he wished to entirely obviate Sunday labour, he found that a reservoir of 8 million gallons would entirely cover the Sunday supply. His figures, however, showed distinctly that to equalize the pumping, 3 million gallons was sufficient, or less than a quarter of a day's supply. He could not therefore agree with Mr. Ingham on his two days' capacity—in fact, he thought a large amount of the money that was spent on service reservoirs would be better expended in increasing the well and machinery standby. He had in his mind a district where they had service reservoir accommodation for seven days' supply; and yet they were short of water in the past summer. If the money that had been spent on the reservoirs had been laid out on wells and machinery, they would, he was convinced, have had a full supply during the whole of the summer. Among other points, he spoke of the use of puddle, agreeing that it should be restricted to those cases in which there were special circumstances which led to its employment. It appeared to him to be better construction to rely on the walls and their solid backing for stability, and upon the treatment of the inner face of the walls for water-tightness. As to circular reservoirs, he found that a square reservoir had an increase in perimeter over a circular one of 12·8 per cent.; and a rectangular one an increase of 19·7 per cent.—of course, all being of the same capacity.

Mr. W. Jones (Pontypridd) said his Company had for various reasons to construct a reservoir immediately above the coal measures. He had had occasion since to consult eminent mining engineers as to the desirability or otherwise of working the coal under the reservoir. One advised him that the better course would be to work the coal entirely from under the reservoir, and allow the reservoir to settle down gradually. Another equally eminent mining engineer advised the Company that it would be far better to purchase the coal seams under the reservoir; but this would have been a costly undertaking. Eventually, it was resolved, if possible, to purchase the coal measures immediately under the embankment; leaving the rest of the reservoir to take its chance. He was sorry this decision was come to, believing personally that the advice given by the first engineer was the safe one—to work the coal entirely from under the reservoir. They had unfortunately two owners to deal with; and some two years ago they received notice of the intention of a colliery company to work the coal under the embankment. His Company were very anxious to treat with them for the purchase of the coal. The colliery company, however, deferred the matter; but during the recent jump in the price of coal, they were desirous of coming to terms. Consequently, the purchase had been the subject of a long arbitration, and had cost his Company a considerable sum of money. He gave experiences of reservoirs being affected by workings nearly 450 yards in depth; and then referred to difficulties occasioned by springs. He considered the placing of a valve on the floor of the reservoir, and allowing the spring to come into it whenever the pressure was sufficient, was an excellent way of getting over this trouble.

Mr. W. Matthews (Southampton), speaking on the size of service reservoirs, said he was able to get on exceedingly well with but a day's storage. Only about 20 to 25 per cent. of the water ever went into the service reservoirs; and he found a day's storage was sufficient for a supply running up to a maximum of nearly 4½ million gallons per day. He agreed that a concrete reservoir could be made completely tight if the inside rendering was put on in a proper way. His practice had been to render the inside about ¾ inch thick, dust the last part of the rendering over with neat cement, and work down with iron, so that it had a surface almost like marble. As to the inlet-pipe, he thought the best plan was to bring it in over the bank, and turn it over the side, with a bell-mouth over the bottom. As to the bye-pass to the reservoir, he considered the putting in of a partition wall much better. He related a little experience with a reservoir built on the boulder clay. The walls were designed far too heavily; and the effect was they forced the floor of the reservoir up internally, causing a great deal of trouble. On the question of covered service reservoirs, he thought it might be taken as a general rule that most, if not all, well waters would not keep in open reservoirs; but it did not follow that there might not be some soft waters which would keep all right in the open. The fact of the water being soft, however, was not sufficient. If they had a hard water which had been softened by the Clark process, it was even more necessary to have that water covered up, and kept from exposure to the atmosphere, than, he might say, any water used. As to reservoir coverings, he did not think wood roofs with slates and corrugated iron appealed to water engineers as desirable things. In the present attitude of the Local Government Board, he did not believe they would get a loan for such things. As to the relative cost of circular and rectangular reservoirs, a case came to his notice a short time ago in which the Local Government Board refused to sanction the plans for a circular reservoir, and insisted upon it being built in rectangular form, at an increased cost. No arguments would move them. They would not argue the matter on its merits; but they formed their opinion and stuck to it. He also remarked upon the style of reservoir construction, and its relation to the area of cover required. On the point as to the relative cost of brick and concrete piers, he thought there was a consensus of opinion that brick ones were the better. There was now being introduced into this country a material called ferro-concrete, with which piles about 13 inches square were made; and he thought perhaps this material might be worked up into suitable lengths for reservoir columns.

Mr. C. H. Priestley (Cardiff) expressed a preference for cast-iron columns. He gave satisfactory experience as to the water-tightness of a concrete reservoir; but in regard to one constructed of concrete with a top covering of asphalte, water got under the asphalte, and it had to be taken up. In its stead, they put down 3 inches of concrete, with a rendering on the face, which made the reservoir quite tight. The remarks of Mr. Bancroft and Mr. Matthews in regard to the capacity of service reservoirs would not apply in his case, because he had a long line of main from his storage reservoirs—about 35 miles—and that pipe-line was liable to be fractured at any time. They had constant difficulties in colliery districts; and he found a fortnight's provision in the way of service reservoirs was not too much. Referring to the examples of floors given by Mr. Ingram, he mentioned one he had himself constructed with an inch rendering on the top of 3 inches of 4 to 1 concrete and 7 inches of 6 to 1 concrete; and this he found perfectly satisfactory. He spoke against concrete being used in conjunction with puddle. Where the inlets were at the bottom in his reservoirs, a sill had been put in for the water to flow over. If the sill was made of 1 to 1 cement rendering, with an inlet well, or something of that sort, it was quite sufficient to prevent damage to the floor of the reservoir. He, however, liked the construction where the water could be taken in either at the top or the bottom.

Mr. C. E. Jones (Leyton) supplied a considerable amount of information from his experience of reservoir construction in colliery districts. It was, he said, undoubtedly desirable, wherever practicable, to construct reservoirs of all kinds on virgin soil. This could not always be attained in colliery districts, and then it was the safest plan not only to purchase the coal, but to purchase a sufficient quantity to afford a protective area to the structure. Reservoirs were sometimes constructed on land from which the minerals had been extracted; and they were generally a source of much trouble—were seldom tight, and entailed a large expenditure in periodic repair. Where such reservoirs were made, it was desirable to construct them as shallow as was reasonably possible. The deeper the reservoir and the heavier the walls, the more liable it was to subsidence. He was acquainted with many reservoirs in the colliery district, and very few were absolutely tight. Wherever coal had been cut, or the virgin soil had been attacked, then, even a considerable distance beyond, there would always be a tendency for the soil to creep and subside.

Mr. Stephen H. Terry (London), formerly one of the Engineering Inspectors of the Local Government Board, asked Mr. Matthews for the date when objection was made to the circular reservoir to which he had referred. He proceeded to give particulars of a circular reservoir of which he made a drawing for Sir Robert Rawlinson; and stated that at a meeting of the Institution of Civil Engineers, Sir Robert alluded to this drawing, and said he strongly recommended the use of circular reservoirs. It was therefore somewhat odd that the Board had withdrawn from that which was the recommendation of their late Chief Engineering Inspector. A circular reservoir gave a larger storage capacity per cubic foot of material used, and also the lowest possible wetted surface, which seemed to him to be an advantage in storage reservoirs.

Mr. Matthews stated that the circular reservoir to which he referred was for Newport (Isle of Wight); and it was last year that the Board refused to allow its construction.

Mr. Terry said this was a matter which affected them as engineers; and no member of the Institution of Civil Engineers who had had experience in designing reservoirs ought to be overridden by some person who had not had experience.

The Chairman (Mr. Frederick Griffith, of Leicester) considered it was very undesirable to put ordinary puddle in retaining walls. He had never found that puddle and cement concrete, or concrete at all, went well together. The one tended to injure the other, either by settlement or by fracture. He had had considerable difficulty with a reservoir in which springs rose in the bottom. But they dealt with the trouble in this way: They sank a shaft below the lowest point of the reservoir, drained the reservoir to that sump, and pumped it out. Then they laid cement concrete about 12 inches thick all over the bottom,

following with bitumen, and then brick on edge and cement. By this means, they had rendered the work thoroughly tight; and it was kept dry until the cement had had an opportunity of setting. He also referred to the strengthening of puddle by the use of broken macadam.

Mr. INGHAM, in reply, thought that Mr. Mitchell was labouring under a wrong impression. If they put the foot of concrete in the bottom of a reservoir and 4 feet in the sides, surely the water would get through the foot quicker than the 4 feet. He did not think that engineers would ever put in bricks as the facing to reservoirs. As to reinforced concrete, they had not yet had time to see what the result of its use would be. Regarding inlets, and referring especially to open reservoirs, in the case of gravitation works, it was not always advisable to place the inlets at the bottom to stir up the mud; but in the case of pumping works, the position of the inlet was immaterial to some extent. It was, however, always well to have an inlet where it could be seen. He favoured the division of a reservoir into two rather than have a bye-pass. In rendering, he agreed that "elbow grease" was the chief thing; but in the case of open reservoirs there was, as Mr. Hill mentioned, a difficulty in making it water-tight on account of the frost. It was not always advisable to put floating arms in reservoirs, as they drew the water from the top, and the water below got stagnant. In view of fires and machinery getting out of order, he did not think two days' service reservoir capacity was any too much.

Mr. BANCROFT (interposing) stated that he fancied they had had at Hull some of the largest fires in the kingdom; and they had been satisfactorily coped with without a reservoir.

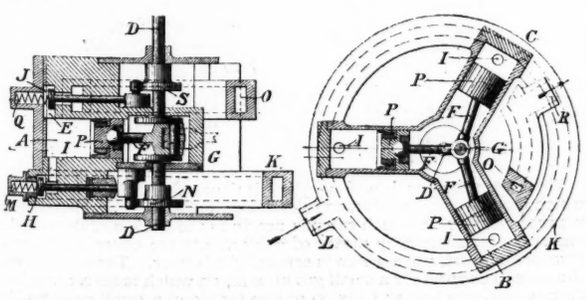
Mr. INGHAM (proceeding) said that in his own case his storage reservoir was 16 miles from the town. It would cost him £40,000 to lay a new 12-inch main; and he thought he would rather spend £5000 or £6000 in increasing his service storage than provide an additional main at that figure. Reference had been made to the use of asphalte on the top of concrete. They had a reservoir at Plymouth of a capacity of above 7 million gallons, and it was constructed in that way. They had had no trouble with it; and it was constructed in the early part of 1894. But he could see the difficulty which would follow, if there was a chance of water rising underneath. He was surprised to hear that the Local Government Board had refused to pass a circular reservoir. The Board was a body in whom engineers had not very great reliance. They wanted practical men at the Local Government Board, and men who had had to deal with the class of work they had to inquire into. There was no sense in the present condition of things.

A vote of thanks was passed to Mr. Ingham for his paper.

REGISTER OF PATENTS.

Liquid Meter.—Mills, B. J. B.; a communication from J. M. Duchamp, of Lyons, and R. Phillipe, of Barbe, France. No. 23,588; Dec. 24, 1900.

This liquid meter is composed of at least three pistons, moving in as many cylinders, which are filled and emptied successively by means of a set of valves operated by the passing of the liquid to be measured.



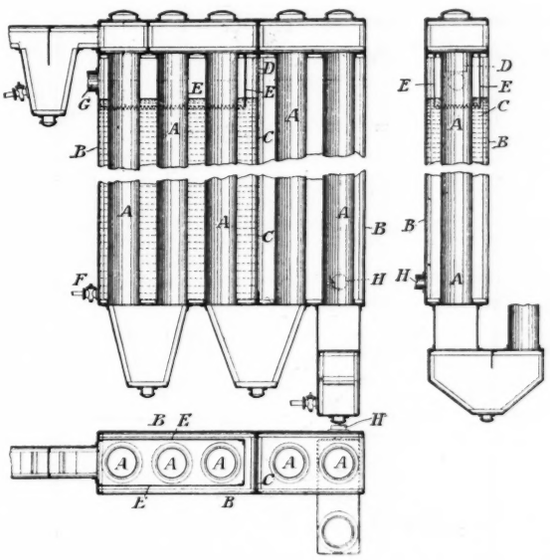
The cylinders A B C are arranged radially around a vertical shaft D, at equal angles of 120°. They are each traversed by a piston P, attached by a rod F to a single crank-pin G of the shaft. Each cylinder is provided near the outer end (that furthest from the crank-shaft), with an inlet-opening I, closed by a valve H, and with a discharge opening E, closed by a valve J. The three inlets open into a circular channel K, into which opens the tube L conveying the liquid into the meter. The valves H are kept closed by springs M, and are opened by the action of a cam N fixed on the shaft. The shape of this cam is such that with each cylinder the admission remains open during the entire forward stroke of the piston, and closed during the entire backward stroke, whatever may be the position of the pistons. There is, therefore, always at least one valve open. The three discharge-valves J open into a circular channel O, to which is connected the tube R serving for the discharge of the liquid. They are kept closed by springs Q, and are opened during the backward stroke of the piston by the action of a cam S fixed to the shaft.

The liquid entering by the tube L into the circular channel K enters the cylinder the admission-valve of which is open—for example, the cylinder A—and pushes the piston to the end of its stroke to the position shown in the horizontal section. At this moment, the admission to the cylinder A is closed; but the piston of the cylinder B having already made a third of its forward stroke, this cylinder is open to the admission, and the motion continues. The piston of the cylinder A then forces the liquid into the channel O past the discharge-valve which has just opened. The same effects are reproduced successively in the cylinders B and C: and after a complete rotation, there has passed from the channel K to the channel O a volume of liquid equal to the volumes generated by the three pistons. This volume is registered outside by a train of gearing and dials operated by the shaft D.

Heating Producer and other Gases.—Duff, E. J., and the United Alkali Company, Limited, of Liverpool. No. 100; Jan. 1, 1901.

In explanation of their proposal, the patentees say: "In gas-producer plants arranged for the recovery of ammonia from the gases, the gases are usually passed from the producer through a "temperature interchanger" before being washed by a water spray. This interchanger is usually constructed of pipes through which the gases issuing from the producer pass. The pipes are surrounded by other pipes, or casings, through the space between which and the first-named pipes, the air and steam pass on their way to the producer. This method—owing to the slow rate at which moist air absorbs heat—does not admit of the reduction of the temperature of the gases below about 300° C.; and when the gases at this temperature strike the water spray in the washer or scrubber, there is a great absorption of heat by the water, and a large amount of water vapour is added to the gases, with the result that it is necessary to employ ammonia-recovery and gas-cooling towers of considerably greater size than would otherwise be required.

They therefore surround a portion of the pipes of the interchanger by water, instead of by air and steam; the portion so surrounded being preferably that through which the gases last pass—that is, the portion nearest to the washer or scrubber. By this means, the spare heat is absorbed, and the temperature of the gases reduced to nearly the temperature required to maintain the water just below boiling-point, and reduce the gas to a temperature at which very little heat will be given to the water in the washer or scrubber. The heat which previously evaporated water will thus be absorbed in the interchanger to raise steam, which will become absorbed in, or mixed with, the moist air passing through the interchanger, and thus be restored to the producer as heat.



The illustration shows the application of the invention to the temperature interchanger described in patent No. 18,582 of 1899. Fig. 1 is a vertical section, fig, 2 a horizontal section, and fig. 3 a cross section.

The interchanger is constructed of a number of vertical tubes A (through which the gas passes) enclosed in a rectangular chamber B. A number of these tubes (preferably those nearest the gas-outlet) are surrounded by water to within a short distance of their upper ends; the space enclosing the tubes so surrounded with water being separated from the rest of the space by a diaphragm C, with an opening D at the upper part above the water-level. Between the gas-pipes and the outer shell are depending partitions E, constituting a bottomless chamber with its serrated lower part dipping into the water admitted at F. The air from the blowers enters at G into the space between the plates E and the upper parts of the gas-pipes surrounded by it, and is forced through the water, and issues under the serrated edges of the plates into the space between them and the outer casing— absorbing in its passage both heat and moisture from the water made hot by contact with the gas-pipes which pass through it. The air thus carries off with it a large amount of vapour; and this saturated hot air then passes through the opening D into the space around the remaining gas-pipes not surrounded by water, and as these pipes are nearest to the producer, and convey the hottest gas, the air and water vapour passing in contact with them becomes superheated on its way to the outlet H at the lower end of the chamber, from which it passes direct to the gas-producer.

Machinery for Unloading, Heaping, Storing, Screening, and Loading Coke, Coal, and Other Materials.—Woodward, J., of Manchester. No. 398; Jan. 7, 1901.

This is a modification of patent No. 25,298 of 1898; the object more particularly being to facilitate the screening and loading of the stored

or stocked coke or other material, directly into carts or vehicles by which it is to be taken away.

One convenient manner of carrying the invention into effect is

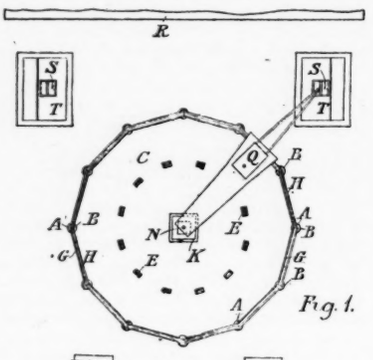


Fig. 1.

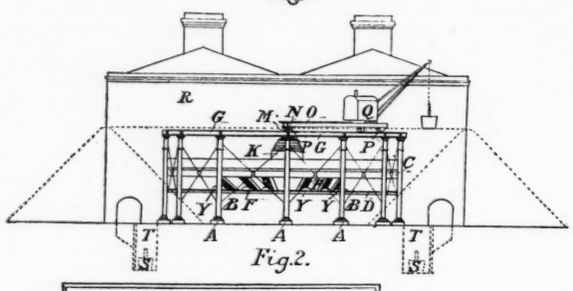


Fig. 2.

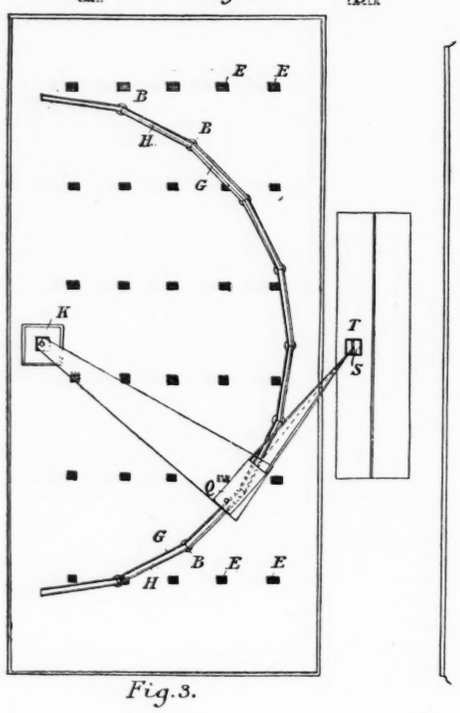


Fig. 3.

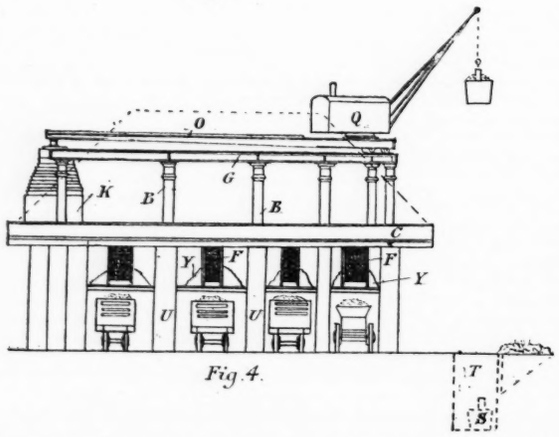


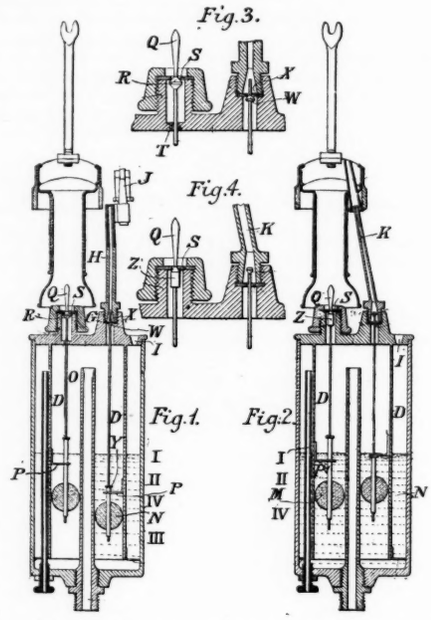
Fig. 4.

illustrated by figs. 1 and 2. Here piers A of brickwork, stonework, or concrete support iron or steel columns B, in the form of a regular polygon. From these columns beams carry two platforms C and D. The upper platform C is provided with a number of holes E, under each of which is placed a screen F extending down to the lower platform in an inclined direction. The lower platform is cut away below the screens, so that, when coke is dropped through the holes in the upper platform, the larger particles will fall into carts placed beneath, while the siftings will pass through the meshes of the screens and collect in heaps Y behind the screens and on the lower platform. From here the siftings can be removed through sliding doors or their equivalents, and allowed to fall into carts below. The holes in the upper platform are also provided with sliding doors. On the top of the columns are girders G connecting each column with those on either side of it; and on these girders are placed rails H. There is a centre column K about the same height as, or slightly higher than, the other columns; and on the top of this is a flat plate M and a pivot N. This carries a carriage or platform O, to the underside of which are attached rollers P, of which the outer ones are broad and run on the rails H, while the inner ones run on the plate M. The platform or carriage supports a crane Q; and as the platform can roll round the top of the structure, the crane commands a large circular area. When dealing with coke, the material can be deposited from the retort house R into buckets S situated in pits T, from which it can be raised by means of the crane.

According to figs. 3 and 4, the platforms C and D are of rectangular section, and supported on brickwork and stonework columns or piers U. On the top of the upper platform are iron or steel columns B; and on these are placed the girders G carrying the rails H. The columns are in this case arranged in the form of a semi-polygon. The screens F, the central column K, and the platform O and crane Q are arranged as in the first form of the invention.

Automatic Gas-Lighting Apparatus.—Sefton-Jones, H.; a communication from C. Fader, of Mendoza, Argentina. No. 906; Jan. 14, 1901.

This invention is designed to fulfil the purpose of lighting the public gas-lamps simultaneously (without further attention), preferably from the gas-works, or, in the case of domestic gas-lights, from a pressure-regulator inserted in the gas-main in the house itself; also of regulating automatically the separate lights, and of extinguishing some during the night and the rest simultaneously at dawn.



The apparatus consists of a cylindrical vessel, into the bottom of which is screwed a gas-pipe, and the cover of which is provided with a plunger cylinder D, which extends nearly to the bottom of the vessel, and is centred therein by means of guides. On the cover is a screw-threaded support, upon which is screwed the burner. There is also on the cover a support for a small gas-pipe H, on which is set a revoluble spongy platinum igniter J (fig. 1) or else (as fig. 2) a small gas-pipe K, which opens into a conical tube attached to the main burner, and forms for this latter a small ignition-flame burner. In both figures, M represents a cork float, to which is screwed a thin valve-rod, the upper end of which is provided with a very slender cone Q, serving for automatically regulating the strength of the flame at different pressures.

In fig. 1, R is a ball-valve (clearly shown in fig. 3), which, when the float M rises, closes the aperture of the valve-seat S, and when it sinks closes the aperture of the valve seat T. In fig. 1, the valve-rod of the float N is provided with a conical plug W, which closes the aperture of the valve-seat X when the float is at its highest point, and opens it sufficiently when at its lowest point—that is, when the stop Y of the rod strikes against the angle-piece P. Similarly, in fig. 2 the valve-rod is provided with a valve-plug Z immediately below the cone Q (as clearly shown in fig. 4); and the plug on the rise of the float M to its highest position closes the opening in the valve-seat S.

The vessel is filled up to a certain height with glycerine, in which M and N float at regulated heights. In order to adjust the quantity of liquid for a given maximum pressure, an overflow-pipe is placed between the wall of the vessel and the plunger cylinder D, and adjusted to the height corresponding to the maximum pressure. On the other side a supply aperture I is made in the cover C, through which the liquid is poured at the beginning, and it is filled up again periodically.

The hole also serves to continually equalize the pressure in the space between the plunger cylinder and the vessel with that of the outer atmosphere—consequently to make them correspond.

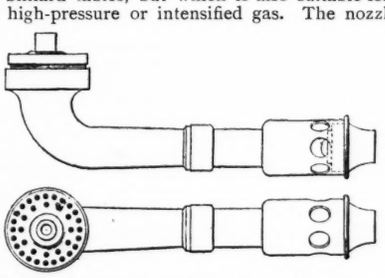
The gas-lighting apparatus with the spongy platinum igniter shown in fig. 1, operates in the following manner: When the gas-lamp is out of use—that is, when the gas-cock is closed—the liquid stands in position I. at equal height. The float M is then in its highest position, and the double valve-plug R completely closes the aperture of the valve-seat S. Likewise the float N is at its highest point, and the valve-plug W closes the aperture of the valve-seat X. After the cock has been turned on, the pressure of the gas depresses the liquid in the plunger cylinder into position II., whereby it rises a corresponding amount between the main vessel and the cylinder D. The two floats remain stationary; and in this position no gas passes to the burner or igniter J. As soon as the ordinary pressure of gas in the day-time is increased for about a minute to the maximum pressure from the works, the liquid in the plunger cylinder D is forced down to position III. The float M thereupon first sinks and closes the aperture T. Meanwhile, the float N also sinks and causes the valve-plug W to open the passage in the valve-seat X, so that the gas passes to the spongy platinum J and ignites there. After this has taken place, the maximum pressure from the works is adjusted to the evening pressure, and consequently the liquid in the plunger cylinder again rises to position IV., and lifts the two floats once more—first of all, the float M with the valve-plug R rises, but still leaves the passage in the valve-seat S open, so that the gas reaches the main burner, which ignites at the ignition-flame of the pipe H; and directly afterwards the float N rises higher, and closes the passage at X, so that the ignition-flame is extinguished. To extinguish the lamps at dawn, the night pressure (reduced after midnight to morning pressure) is adjusted to the day pressure from the gas-works. Consequently, the liquid rises again in the plunger cylinder to position II., and correspondingly the float M closes the passage in the valve-seat S, and shuts off the supply of gas to the main burner, and the flame is extinguished.

The apparatus with a small bye-pass burner, illustrated in fig. 2, operates in the following manner: When the gas-lamp is out of use—that is, when the gas-cock is turned off, and before it is put in operation for the first time—the liquid is everywhere at an equal height in position I. The float M is in the highest position, and closes the aperture of the valve-seat S. Accordingly, the float N is also at its highest, whereby the valve-plug leaves the passage in the valve-seat. On opening the gas-cock (which afterwards always remains open) the liquid in the plunger cylinder D is forced down with the day pressure of the gas into position II.; the float still remaining as it was. Gas, however, passes through the pipe K to the small burner, which once and for all is now lighted by outside means. As soon as the ordinary day pressure is increased from the works to the evening pressure, the liquid is pressed down in the plunger cylinder to position IV., whereby the two floats sink, as they are so adjusted that M sinks before N follows it, which consequently has the greatest impulse. The valve-plug of the float M opens the aperture of the valve-seat S, and lets gas flow into the main burner, which ignites at the bye-pass flame of the small burner. Immediately thereafter, the float N sinks and closes the aperture of the valve-seat; and consequently the bye-pass flame is extinguished after the main burner has been ignited. To extinguish the chief flame, the morning pressure is changed at the gas-works to the day pressure. Thereupon the liquid rises again in the plunger cylinder, and after this also the float M, which closes the aperture in the valve-seat S—but after the float N has risen, whereby the plug opens the aperture of the valve-seat so that gas can again pass to the bye-pass and ignite at the flame of the main burner F before the latter is extinguished. The bye-pass flame then burns all day, until the evening pressure is put on again from the gas-works.

In case a number of lamps are to be extinguished during the night, the float M is so adjusted that it puts out the light during the morning pressure (from midnight to dawn), which comes between the maximum evening pressure and the day pressure, which pressure is adjusted at a given time from the gas-works.

Incandescent Gas-Burners.—Sugg, W. T., of Westminster. No. 1473; Jan. 22, 1901.

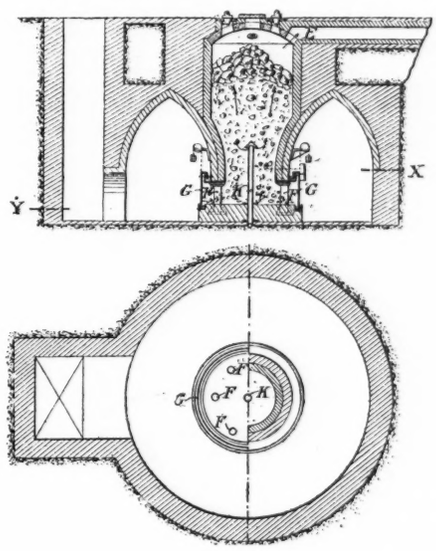
The object of this invention is to provide a burner—"more especially for use with billiard tables, but which is also suitable for other purposes"—for high-pressure or intensified gas. The nozzle injects a



stream of gas into the smaller end of a trumpet-mouthed tube, and draws in with it the requisite quantity of air to produce a suitable mixture. The outer end of the burner-tube is curved round at right angles to the rest of it, and carries the burner proper, which is made of steatite, as described in patents Nos. 15,521 and 23,398 of 1899. The burner-tube is set horizontally, with the turned-up portion vertical; and the burner proper carries the peg to support the mantle—as shown. The gas is injected into the burner-tube, and draws in with it a "sleeve of air;" the two streams (gas and air) maintaining their relative positions round the bend until they strike the underside of the burner, as described in the earlier patents referred to.

Utilizing the Heat of Coke Removed from Retorts.—Gobbe, E., of Jumet, Belgium. No. 2020; Jan. 29, 1901.

This invention has for its object to utilize the heat of red-hot coke, as drawn from retorts, in a gas-producer, as illustrated. In the sectional plan, the right hand part is through the line X, and the left hand through Y. The producer consists of a deep chamber closed at the top by an arch, in which an opening is provided through which the red-hot coke is fed, but provided with a cover of refractory material. Closeable sight-holes are also provided at top, to permit of the inside of the producer being examined, and of the coke being stirred so as to facilitate its steady descent, or of filling the empty spaces that may be formed in its mass. The gas escapes (or is extracted by exhausters)



from the producer through a flue E provided with a damper. The lower part of the producer rests on columns F, preferably of cast iron; and the ash-pit is hermetically closed by an annular cover G, which dips top and bottom into annular water-seals. A central pipe K delivers steam to the producer. The red-hot coke from the retorts is emptied into sheet-iron barrows, lined inside with refractory material, so as to avoid cooling the coke, and then dropped into the producer. The coke is afterwards cooled, without the intervention of air, by the steam issuing from the central pipe K, which steam is first heated by contact with the coke. As the steam rises into the producer, it meets with coke which is hotter and hotter, until the temperature of this coke is high enough to cause the decomposition of the steam into hydrogen and carbon monoxide. Water gas is thus produced; and the "whole of the sensible heat contained in the coke is recovered as latent heat in the gases produced."

The patentee remarks that, as the sensible heat of red-hot coke is at least 5 per cent. of the calorific power of coal, there will therefore be a minimum saving of 5 per cent. in the weight of the distilled coal or 25 per cent. in the weight of the coke used in heating the retorts or ovens, "for which the water gas thus produced is eminently suitable."

APPLICATIONS FOR LETTERS PATENT.

24,440.—Atkins, H. F., "Gas or other engines." Dec. 2.
24,483.—Smith, H. F., "Burners." Dec. 2.
24,484.—Sugg, W. T., "Incandescent gas lighting." Dec. 2.
24,493.—Smith, S. R., "Gas-engines." Dec. 2.
24,570.—M'Intosh, A., "Generating acetylene gas." Dec. 3.
24,577.—Toltz, M., and Lipschutz, A., "Acetylene gas lighting system." Dec. 3.
24,579.—Marshall, F. D., "Apparatus for conveying or transporting hot coke." Dec. 3.
24,677.—Askham, W., "Oil and gas engines." Dec. 4.
24,691.—Kemp-Welch, J. S., "Producer-gas apparatus." Dec. 4.
24,721.—Clayton, R., "Gas-fires." Dec. 4.
24,784.—Böhm, E., "Gas globes or chimneys." Dec. 5.
24,832.—Wilton, G., "Distillation of ammoniacal liquor." Dec. 5.
24,861.—Gorman, R., and Tully, C. B., "Collection of coin in gas-meters." Dec. 6.
24,879.—Whitworth, F. J., and Short, A. J., "Anti-vibration joints for gas-pendants." Dec. 6.
24,919.—Bolz, C., "Gas-meters." Dec. 6.
24,960.—Crossley, W. J., and Atkinson, J., "Gas cleaning and cooling apparatus." Dec. 7.
24,980.—Hodgson, J., "Incandescent gas-fittings." Dec. 7.
24,986.—Blake, R. A., "Incandescent gas-burner." A communication from J. Hardt. Dec. 7.
25,013.—Stoltenhoff, H., "Lighting gas-lamps at a distance." Dec 7.
25,019.—Webb, S. H., "Lamps." Dec. 7.

New Reservoir for Dewsbury.—The Dewsbury and Heckmondwike Water Board contemplate the early construction of another reservoir at Dunford, in the parish of Penistone. Mr. George H. Hill, of Manchester, the Engineer to the Board, has made a survey of the district, where there are already five reservoirs belonging to the Board, with the view of obtaining the necessary parliamentary powers; and his report will be considered, it is expected, in January. Altogether the Board own nine reservoirs, including two local service reservoirs; and the entire storage capacity available for supplying the two towns is 482,863,526 gallons. The total capacity (both compensation and storage) is 722,046,358 gallons.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Carbonizing Wages at the Commercial Gas-Works.

SIR,—It is my duty to point out that the comparison drawn in your issue of the 3rd inst., of this Company's cost of manufacture and labour, is entirely invalidated by the fact that it covers a large proportion of carburetted water gas.

H. E. JONES.

Commercial Gas Company, Stepney, E., Dec. 16, 1901.

The De Brouwer Coke-Conveyor at the Wakefield Gas-Works.

SIR,—In the article in your last issue under the title of "Fair Play for the De Brouwer Conveyor," you give it as your opinion that the height of our conveyor has something to do with the amount of breeze made, and suggest that if it was furnished with hoppers for delivery into carts this would be diminished.

In this, you are quite right. Our conveyor is 25 feet above the ground; and a fall of 25 feet is certainly not a good thing for coke. The reason it was placed so high was for the very purpose of allowing hoppers for filling carts to be constructed beneath it, when an opportune time arrives for doing so.

I feel that it is only just to the De Brouwer conveyor to make this explanation.

H. TOWNSEND.

Wakefield, Dec. 14, 1901.

The Cost of Carbonizing by Inclined Retorts.

SIR,—I was very pleased to read in your issue of the 3rd inst. the Editorial Note respecting the Manchester District Institution meeting at Wakefield—particularly with regard to the discussion upon the cost of carbonizing per ton by the inclined-retort system; and I for one would be delighted to support any proposition specifying definite charges to be made, so that one works will compare with another on every footing.

I am aware that the first difficulty would be the different sizes of retorts in use. For instance, in Wakefield the retorts are much larger than in Rotherham. But the labour is practically the same. Therefore, Mr. Townsend's cost per ton comes out much less than mine. Still, even this difficulty, with co-operation, might be overcome.

FRANK A. WINSTANLEY.

Rotherham, Dec. 9, 1901.

Inclined v. Horizontal Retorts.

SIR,—I have read with much interest the recent discussion appearing in the pages of the "JOURNAL."

Your correspondent, Mr. Samuel Glover, deserves the best thanks of gas engineers for his firm and decided attitude on this question; and it is to be hoped that some agreement will be come to by the gas authorities whereby a reasonable comparison of the two systems may be made.

Particularly interesting has been the correspondence between Mr. W. R. Herring and Mr. Glover. Mr. Herring's recent replies to Mr. Glover, however, do not suggest to my mind that entire disagreement in the methods of carrying out carbonization which one might infer from a casual reading of the correspondence. If these gentlemen will modify and develop their rival systems in such a manner as to overcome the objections and prejudices which either side might raise, I venture to think a system might be devised which would be acceptable to both parties.

Take as a case the inclined-retort system as expounded by Mr. Herring, and develop it on deductive lines. In Mr. Herring's Conference address at Glasgow (see "JOURNAL" for Sept. 24, p. 769), I find, in speaking of the discharge of coke from the retorts as not being entirely automatic, he says: "With such a form, the process will become as near automatic as it is possible to have it without introducing additional mechanical devices. This, however, can easily be done; and the author is making preparations for it in the Granton erections by having a hydraulic or compressed-air piston, working in and out of the retort from the upper side, arranged with an accelerating motion so that the piston-head will, upon entering the retort, start very slowly, and gradually increase in speed, descending from 8 to 10 feet into the retort—thus giving the charge the necessary impulse to traverse down the slope of the retort."

Let us carry out this idea, in a reasonable manner, to its logical conclusion. We must first construct this ram or coke-pusher in such a manner as to make it as effective as possible for the work on hand; and one of the first points which suggests itself is the restriction which Mr. Herring places upon the length—viz., 8 to 10 feet. Why not make it the entire length of the retort? By doing so, it will be obvious that under no conditions will any coke remain in the retorts after the operation—provided, of course, there is no jamming.

A good coke ram or pusher the whole length of the retorts is, to some extent, an intricate appliance, and besides a somewhat costly one; and the idea at once suggests itself to utilize it for some double duty. I venture to think that we have this double duty just at hand. Why may we not combine the coke ram with a coal-charging scoop? The scoops might be constructed on similar lines to those employed on horizontal stoking machinery, with this difference, that several partitions might be provided in the entire length, in order to prevent the coal rushing down to the ram or bottom end

The advantage of such an appliance will at once become evident. By its adoption, this combination will do away with the present measuring boxes, charging shoots, and railway.

We shall then have an inclined retort installation with all its most satisfactory features intact, and, in addition, with an appliance akin to one which has worked most successfully in the horizontal system.

On the other hand, the partisans of the horizontal system will only be asked to incline their retorts and use a stoking machine somewhat similar in design to, but slightly less intricate than, the one they are in most cases familiar with.

EVOLUTION.

Dec. 13, 1901.

LEGAL INTELLIGENCE.

Gas-Meter Inspectors and their Right of Entry.

At the Wakefield County Court, last Tuesday—before Judge Greenhow—a collector (named Day) in the employ of the Wakefield Gas Company, was sued by Adolphus Birdsall, basket maker, Kirkgate, Wakefield, for £5 5s. "for damage by trespass by unlawfully breaking and entering his dwelling-house." The claim was based on the fact that during the time the house was empty and the door shut (plaintiff being at work and his daughter gone out), the defendant entered the house and took the pennies from the penny-in-the-slot meter. Mr. E. Lodge, for the defence, said that it was usual for the Company's collectors to visit the houses of customers, knock at the door, and then go inside and empty the meters. His client did not use any instrument for the purpose of gaining access to the house. He simply opened the door by pulling a string which was attached to the latch, knocked, and then went to the meter, thinking the occupant was upstairs and had not heard the warning of his approach. In one of the Company's Acts, there was a clause to the effect that any officer of the Company could, at any reasonable time, enter any dwelling which they supplied with gas. He, therefore, submitted that no damage or trespass within the meaning of the Act had been committed by the defendant. The Judge said he did not think that when premises were unoccupied was a reasonable time for the Company's official to enter. On the other hand, he was of opinion that when there was any difficulty or inconvenience with customers, the Company ought to make some special agreement with regard to the time of entering their premises; and if consumers did not comply, the thing to do was not to supply them with gas. He thought the defendant went into the house at an unreasonable time. Although some people agreed with the present custom of collectors, it did not at all follow that those who did not were not entitled to object to it. He would not sanction the custom, and found a verdict for the plaintiff for 6d., in addition to the 5s. paid into Court, with costs.

Supply of Gas to a Club.

At the Swindon County Court last week (before Judge Gwynne James, K.C.), the Swindon Gas and Coke Company, Limited, sought to obtain a garnishee order against Mr. H. J. Stevens, at one time Trustee of the Conservative Club, Swindon. The circumstances under which the summons was brought were as follows: In June last the Company obtained judgment against the Club for £19 in respect of gas supplied; and an order was made for the payment of £2 per month. Three instalments were now due; and the Company, alleging that Mr. Stevens held a certain sum of money as Treasurer of the Club (he vacating the office of Trustee for that of Treasurer), applied to be allowed to garnishee that sum of money in satisfaction of their claim. The case for the Garnishee was that, at the time the summons was served upon him, he held no money which was the property of the Club; and that, therefore, he was not liable. He admitted that he had received sums of money on behalf of the Club; but, as he had paid some of the Club's debts out of his own pocket, the Committee empowered him to recoup himself by keeping the moneys in question. His Honour accepted the Garnishee's version of the case, and gave judgment for him, with costs.

Gas Company's Clerk Charged with Falsification.

At the Worship Street Police Court, on the 4th inst., A. J. Perry (25), a wages clerk employed by the Gaslight and Coke Company at Shoreditch, was charged on remand with falsifying certain books and accounts. On behalf of the prosecution, it was stated that the prisoner had kept a book which should have shown the quantity of coke "crushed" in the works day by day; and he had to make out the weekly wages-sheets for the men employed in the work of crushing and carrying. From the weekly sheets, the wages were paid; and it was stated that the coke-crushing book had been persistently falsified—the tonnage of the work performed, and consequently the amount due for it, being increased. It was intimated that the money was paid out to the men individually, and that the fraud thus perpetrated could only have been carried out by the connivance of others. Mr. Blakeley, from the accountant's department of the Company, said that, having gone through the accounts in question between July and Nov. 15, he found the amount paid in excess on the coke-crushing wages-sheets was £76 18s. 10d. Detective-sergeant Badcock said the prisoner at the station gave the names of fourteen men employed by the Company as those who had forced him into the commission of the frauds and had shared the money with him. He also said that he had been "jollied" into it by the men, who told him that it had always been done by the man before him, and before that. Evidence was given at considerable length; and it having been intimated that the prisoner, who had made a confession to one of the officials when challenged, would plead guilty, he was committed for trial.

Gas Company's Secretary Charged with Embezzlement.

At a special sitting of the Bellingham Magistrates on the 7th inst., William Hutchinson, late Secretary of the Bellingham Gas Company, surrendered to his bail on a charge of embezzlement. Mr. Oswin Charlton conducted the prosecution, and called Mr. W. Smith, who stated that he was Manager of the North-Eastern Bank at Bellingham, and a Director of the Gas Company. The capital of the Company was about £1500. Accused had been Secretary for more than 20 years. His salary was £6 a year. It was his duty to collect the money due from consumers and give receipts. Witness stated the uses of the different books of the Company. Several witnesses deposed to paying accounts to the accused, and receiving receipts. Mr. J. J. Turnbull, Auditor to the Company, and Mr. J. A. Iveson, a Chartered Accountant at Hexham, spoke to examining the Company's books

and finding discrepancies therein. Sundry expenses were also overstated. The total discrepancy amounted to £102 13s. 1d. Owing to abstraction and obliteration in the books, the extent of the investigation had been limited. The charge of wilfully and intentionally mutilating the books when a servant of the Company was then gone into, and accused was eventually committed for trial on both charges.

Imprisonment for Stealing Gas.

At the Birmingham Police Court yesterday week, a man named Donovan was charged with stealing Corporation gas. It appeared that between Oct. 1 and Nov. 17 Donovan's meter registered no gas, and it was found that the main at the meter had been tampered with. The Inspectors of the Gas Department had experienced difficulty in making their inspections owing to prisoner's habit of keeping bull terriers in his cellar. On behalf of the prisoner the offence was admitted; but it was pointed out that this was no elaborate system to defraud the Corporation, and that prisoner used very little gas. It was suggested that a fine might be regarded as adequate punishment; but the Stipendary could not see his way to such leniency. He held it to be an ingenious and serious fraud, and sentenced Donovan to one month's imprisonment.

Connecting Water-Pipes without Consent.

At the Bristol Police Court yesterday week, a plumber at Kingsdown (named Woodward) was summoned for that he "unlawfully did affix, or caused to be affixed, a pipe or apparatus to a communication or service-pipe belonging to, or used by, the occupiers of No. 10, Houlton Street, St. Paul's, and supplied with water by the Bristol Water Company." Mr. E. E. Gerrish, who prosecuted for the Company, said the house in question was occupied by a firm of vinegar manufacturers, who were supplied with water for trade purposes, and also for domestic purposes to a cottage in their occupation. The premises were supplied by meter, and the Company were paid for the use of water for trade. In the month of November, a bath was fixed in the cottage by the defendant, who was employed to do the work. By the Water-Works Clauses Act (not the Special Act of the Company) it was enacted "that no person may interfere, or touch, or deal with any pipe belonging to the Water Company or consumer without first giving notice to the company, and obtaining their consent to do so." He did not suggest in this case that the firm in question, or the defendant, intended to defraud the Company in any way; but he did suggest that defendant, whose business included dealing with such matters, ought to have known the provisions of the Act of Parliament. The Company had written to defendant for an explanation, and in the course of his reply he stated that, "as the water was supplied by meter, he did not understand that it was necessary to give the Company notice." He (Mr. Gerrish) would point out that the Company were not obliged to supply water by meter at all; and having agreed to do so, they supplied at varying rates for trade, for domestic, and for bath purposes. The Company's only desire in this case was to show defendant and others that the Act of Parliament required that notice should be given in all cases. In reply to the Magistrates' Clerk, as to whether defendant admitted that he had done wrong, his Counsel said that he would admit that on the premises there was a house, and that the house and factory were supplied by one service-pipe, and that the water came through a meter. The defendant was under the impression that, under these circumstances, there was no need to give formal notice to the Company when he fixed the bath. He was not aware of any special agreement between the Company and the firm. He certainly fixed the bath, and was ready to admit the commission of a technical offence. As a matter of fact, the Company had not lost a penny over the affair. The whole thing had been *bonâ fide* and open from beginning to end. Mr. Gerrish said it was only by accident that the Company had heard about the matter at all. He did not intend to press for heavy penalties; but he wished the trade to know that not only must they give the Company notice of such work, but must get their consent to the work being done. The Bench said that they were satisfied a technical offence had been committed; but they did not consider that any fraud had been intended. Defendant would be fined 5s. and costs.

Progress of the Spalding Gas-Works.—From a report which has been presented to the Spalding Urban District Council on the progress of the gas undertaking, it appears that a profit of £18,679 has been realized during the past nine-and-a-half years; and of this amount, £18,490 has been expended on improvements and extensions of the works, or for the benefit of the public lighting. The total cost of the works when purchased was £14,050; and besides this £13,781 has been expended on them out of the profits. In addition, it is estimated that the contribution of the undertaking towards the public lighting of the town amounts to about £550 a year. The only liability now existing on the works (which are in a high state of efficiency) is a debt of £2000. The price charged for gas is 2s. 6d. per 1000 cubic feet.

Water-Works Purchase at Malmesbury.—The Malmesbury Town Council have just obtained the sanction of the Local Government Board to a loan of £6540 for the purpose of purchasing the undertaking of the Malmesbury Water-Works Company; and at last Tuesday's meeting, they had under their consideration the report of Mr. J. W. Restler, the Engineer of the Southwark and Vauxhall Water Company, as to the expenditure which would have to be incurred by the Council on taking over the works, so as to put them into such a state of efficiency and repair as would meet the approval of the Local Government Board. Mr. Restler estimates that a sum of £998 will be needed for the purpose; and other expenses attendant upon the arbitration and the calling in of an Umpire would increase it to £1460. The Council agreed to ask the permission of the Local Government Board to borrow an additional sum of £1460—bringing the total amount borrowed in connection with the water-works up to £8000. A letter was read from the Clerk to the Company asking the Corporation to take over the works on the 25th inst.; but it was decided to reply that the Corporation could not see their way to do so before Feb. 1—the date that is mentioned in the agreement.

MISCELLANEOUS NEWS.

THE GAS EXHIBITION AT THE CRYSTAL PALACE.

Under a large canvas awning covering the main part of the South Transept of the Crystal Palace, are by this time completely lodged the exhibits forming the Gas Engineering Exhibition, the days of which will end on Jan. 11. The formal opening took place last Saturday; but, as has ever been the case, and ever will we suppose continue to be, with shows constituted of a great number of units, subject to the whims, fancies, and direction of many persons, and also to the difficulties of transporting from a distance both heavy and delicate goods, the exhibition at the time of opening is not presented to the public in a finished condition. We have bemoaned the pity of this in the past, and we do so again, as in an exhibition on the somewhat limited scale of this one, every vacant stand, and every unfinished one detracts, in the eyes of the first portion of the viewing public, from the character of the exhibition, and so damages it. In justice, however, let it be said that probably two-thirds of the exhibitors worked up to time, and those who were ready made a very respectable and interesting display. Small though the exhibition is (and we use the word small in its relation to the magnitude of the industry which the exhibition represents), there is much in it, if only it is sought, in which the gas engineer will find interest and delight. So far as the position of the exhibition on Saturday evening made it possible, we have picked out the features of the stands, and direct attention to them in what follows. Some of the exhibitors will find they are only mentioned by name. In most cases, their absence is the reason; and in one or two instances inability to reach the stands before their closing accounts for an apparent neglect. But to the few exhibits unnoticed, we hope to call attention later.

The scheme of the exhibition as originally put forward by the projectors—Messrs. T. G. S. Hersey and C. Lapthorne—would have justified the terms "great" and "international;" but, through various disappointments, the projectors have been unable to carry their first framed plans to completion. The fault, however, is not theirs. They worked industriously with the aim of perfecting what they set out to perform. For example, one of their intentions was that a special gas plant should be laid down, for the purpose of practically demonstrating the advantages of distributing low candle power gas. We regret exceedingly that the time required to construct such a plant was too limited; and the idea had to be abandoned. To gas engineers, to the public, and to ourselves such a demonstration would have been of extreme interest; and from the educational point of view, it would, we venture to think, have produced untold benefits to the gas industry. The ocular proof it would have afforded would have done something towards wiping away the blurred views of those bogglers—more particularly of the municipal type—who have halting doubts as to the advantages to be derived from the reduction of high illuminating standards for gas, or who fail to see that in the high road of the gas industry we have come to a very decided bend. But we must stop, as we are dealing with what we had hoped for in the exhibition, rather than what actually exists. Again, in order that our remarks may not be misconstrued, and readers be led into a supposition that we are insinuating that the exhibition is a failure, let us repeat that, while it is not extensive, it is of good quality, and gas managers (who will find interest in it themselves) will do well to use their influence in prevailing upon members of local authorities and—where distance will permit—private gas consumers to spend a few hours in the Crystal Palace during the four weeks the exhibits will be on view, and particularly in the evening, so that the ordinary and high-power incandescent lighting may be seen.

Now coming to the exhibits, we cannot do better than deal with them sectionally, and in each section taking them in the order in which the stands are enumerated in the catalogue. The firms exhibiting are—

CONSTRUCTIONAL WORK.

Samuel Cutler and Sons
Graham, Morton, and Co., Ltd.
Clayton, Son, and Co.

GAS MANUFACTURING APPARATUS.

Bryan Donkin and Clench, Ltd.
Porter and Co.
Joseph Taylor and Co.
Stirling Boiler Company, Ltd.
W. C. Holmes and Co.
George Waller and Co.

GAS-WORKS MATERIAL AND REQUISITES.

Eerste Hollandsche Yzerts Maaty, Rotterdam
United Asbestos Company, Ltd.
Lanemark Coal Company
Thomas Bugden
Tibbington Collieries and Brick-Works, Ltd.
Lee, Howe, and Co., Ltd.
Clay Cross Company
Consolidated Petroleum Company, Ltd.
Silica Fire-Brick Company

GAS-METERS.

Thos. Glover and Co., Ltd.
Alder and Mackay
Richmond Gas Stove and Meter Company
Greenall's "Positive" Meter Sydicate, Ltd.
Schofield and Co.
Liverpool and London Meter Company, Ltd.

INCANDESCENT GAS LIGHTING AND FITTINGS.

Water Motor and Automatic Liquid Elevator Company, Ltd.
Welsbach Incandescent Lighting Company, Ltd.
Inverted Incandescent Gas Syndicate, Ltd.
Moffats, Ltd.
Lovell and Co.

GAS-FIRES AND STOVES.

R. & A. Main
Richie and Co.
Rotheram and Co.
Economy Gas Cooking-Stoves
Richmond Gas Stove and Meter Company, Ltd.
Imperial Stove Company
Wright and Butler Manufacturing Company, Ltd.
Carron Iron Foundries, Ltd.
S. Clarke and Co.
Kern Burner Company, Ltd.

ACETYLENE LIGHTING.

Worsnop and Co.
Acetylithe Syndicate
Acetylene Illuminating Company
Economic Acetylene Gas Generator, Syndicate, Ltd.

SUNDRY.

Blast-Furnace Syndicate
Burrough's Adding and Registering Machine.

Preparations for stands for two or three of the firms named were not observed going forward; but we are hoping to find them in position on our next visit. However, we will now deal with the exhibits so far as we are able in the order of the foregoing list.

Constructional Work.

Under the arrangement we have chosen, to Messrs. Samuel Cutler and Sons' stand (though far away in the catalogue, being No. 51) falls the first notice. Although consisting entirely of photographs, it will prove of great interest to the engineer, being, as it really mainly is, a study in the advances made in the construction of gasholders. On one side of the stand will be found illustrated examples of erections with the firm's patent guide-framing. There are two photographs over which might with peculiar fitness be inscribed "*tempora mutantur, nos et mutamur in illis.*" Twelve years ago, Messrs. Cutler erected at Vienna for the Imperial Continental Gas Association a three lift holder, 210 feet in diameter, at Vienna; and one of the photographs shows the holder as then erected. Time has wrought a revolution in the gas supply of Vienna, as our columns have recorded; and now the Imperial Continental Gas Association no longer supply the intermural portion of the city. Messrs. Cutler were in consequence called upon to undo their work of a decade ago, and re-erect the holder in the city of Berlin; and this work has just been finished. It is considered by all who have had the opportunity of seeing it to be a great achievement in gas engineering; every original part, without a single replacement, having been used again. It certainly reflects great credit upon the designer and constructors. Another noticeable pair of holders and steel tanks are those for Ipswich and Southend, each 122 feet in diameter and rising 130 feet above ground level. On one of the ends of the stand will be found photographs of carburetted water-gas plants which have been put up on Cutler's system. On the second side, are about fifty pictures of various types of holders, and designs of framing and steel tanks, that the firm have constructed; and they represent a considerable quantity of work. One of them is the Kensal Green 7 million cubic feet holder. The opposite end to that already noticed is devoted to gas-works apparatus of varied kind. One which is particular striking is an illustration of a somewhat special design of roof now in course of erection for the Swansea Gas-Works. It is a circular arched roof 102 feet span, springing from ground to ground, and dispensing entirely with the usual side walls of masonry. Carbonized iron sheeting will form the roof. Cutler's water-cooled gas condensers, patent hydraulic valves, the non-freezing apparatus for application to gasholder cups, and Charles Hunt's patent washer are among the specialities to which the notice of the visitor is invited.

Next we have to take Messrs. Graham, Morton, and Co.'s stand, which is the neighbour of the one already described. We must first compliment the firm on the design of the stand, and its illumination, the very ornate fittings for which, by the way, were supplied by Messrs. James Milne and Son, Limited, and are worth inspection. The pictures exhibited by Messrs. Graham, Morton, and Co, are splendid examples of the photographer's art, being sharp and clear, and bringing details out with a distinctness which adds to the pleasure of their examination. We can imagine that visiting gas engineers will ponder long over the first set of photographs that attracted our attention, as they illustrate the work of the firm in the huge inclined retort-house at Granton, Edinburgh, which house is the embodiment of Mr. W. R. Herring's views on this present-day topic. The central photograph gives a side view of the exterior of the fine building; and those surrounding are views taken of the interior work from the commencement to the completion on the 30th ult.—the final photograph showing the charging-stage. The firm's work was commenced on March 8; and the fires were put in on Nov. 20. Having twice seen the work, and therefore knowing something of its character, it is impossible to restrain a complimentary word to both Mr. Herring and Messrs. Graham, Morton, and Co., on its rapid and successful execution. Immediately on a line with the Edinburgh series, is a frame consisting of 17 full-plate photographs of the various machinery erected, during the last twelve months, by these energetic contractors—including machinery, conveyors, and elevators for transporting various materials in gas and other industrial establishments. On the end of the stand is a magnificent photograph of the drawing-stage of the Edinburgh inclined-retort installation. On the other side is a third series of pictures showing all classes of elevators and conveying machinery for dealing with coal and coke, and screening plant for collieries. The central position is occupied by a photograph of the (at the present time) second largest Mond gas-producing plant erected in England. The contractors were, of course, the exhibitors. The situation of the plant is the works of the Farnley Iron Company at Leeds. The fourth series of pictures shows the various stages in the construction of their improved inclined-retort settings. We come to the end of the stand; and we find there a unique print of the original design of inclined retorts made by Mr. Maurice Graham early in 1890, when he was the Engineer to the Automatic Coal-Gas Retort Company, Limited. Studying this print brings home the great strides that have been made in the system of carbonizing on the inclined system since those days. Another point about it that catches the eye is that the design includes a hot-coke conveyor, which is proof positive that, from the commencement of the introduction of the inclined system in England, it was intended, directly an opportunity could be found and gas engineers were educated into the principles of mechanically conveying hot coke, that what is to-day a growing feature of gas-works plant should become part and parcel of the system.

Messrs. Clayton, Son, and Co., Limited, also display a goodly collection of plans and photographs of their well-known work in gasholder and apparatus construction; and visitors will not find their time misspent by stopping awhile to examine the views.

Gas Manufacturing Apparatus.

On stand 1*a*, Messrs. Bryan Donkin & Clench's small exhausting plant and general gas apparatus are on view. The compactness of the exhausting plant, the engine and exhauster being on one combination base plate, will be admired. Being in motion, the effective and smooth working are demonstrated; and this and the improvements show that the firm's plant has reached the stage of practical perfection. In fact, both in their exhausters and other apparatus, the name of the firm has, as their exhibits bear witness, always been associated with advance and good production.

In a central space in the transept Messrs. Porter and Co., of Lincoln, make a bold exhibit with a small single lift gasholder, with three columns and tank, as the central feature; sections of acetylene generators being among the other articles on view. Gasholders are not of a character which pay to send about the country for brief exhibition; and therefore Messrs. Porter and Co. must be thanked for their generous contribution.

The principal feature at the stand (No. 6) of Messrs. Joseph Taylor and Co., of Bolton, is a magnificently constructed sulphate of ammonia saturator, which embraces their up-to-date improvements. The firm have shown a commendable eagerness for obtaining from practical working suggestions for raising the character, both in respect of performance and durability, of their work; and they have met with deserved success. Among the features which will be noticed as being of recent adoption are the double detachable ammonia-pipes, the detachable acid-pipe, the method of supporting the top, the means of preventing the apron bulging, and the lips on the front and sides for timber lagging. Of this identical make of saturator, we do not think one is to be found south of London, although the firm have supplied several of their former type. The one on view is destined for duty at Louth (Lincs.). Its capacity is 30 cwt. per 24 hours. When we mention that this cumbrous piece of gas-works furniture weighs 3 tons, it will be conceded that the firm were enterprising in sending it so far out of the course to its ultimate destination, in order to be represented at the exhibition. The danger to the operatives of indifferently constructed acid-cocks is well known; but some gas engineers have fads of their own in this detail of ammonia plant, and prefer their adoption to what is proposed by practical men in this line of work. An exceedingly good tap, and its construction declares an absolutely safe one, is shown by the firm. Examples of sulphate fishing scoops and ammonia-pipes of various thicknesses and sizes complete an interesting exhibit for the gas manager.

Entering the exhibition from the centre transept, even the lay visitor is attracted to Stand No. 13. There the Stirling Boiler Company, Limited (whose London agents are Messrs. Jones and Younger, of No. 98, Great Tower Street, E.C.), are showing a working model, in a glass case, of their standard boiler and a sectional model of a gas-fired boiler. The firm are making an effort to interest gas engineers in the operation, resulting duty, and advantages of this type of boiler; and they could not have taken a more effective course for doing this than to show the sectional model, which explains exactly the construction of two boilers which they are now putting into the Granton Gas-Works, at Edinburgh. Combined with the boilers are gas producers designed by Mr. Herring and shown by the model. The heating surface in each boiler is 3990 square feet, and each is intended to evaporate 22,000 lbs. of water per hour, which is equal to four Lancashire boilers, 28 ft. by 7 ft. 6 in. diameter. This speaks volumes as to the capabilities of the Stirling boiler. But to return to the working model, the construction of the boiler and its action are worthy of more than passing observation. It shows very clearly the circulation of the water in the boiler; but while simple in construction, the latter is somewhat difficult of description. The feature to first attract attention is the peculiar setting of the four ranges of tubes. They are inclined; and the nearest approach to their appearance is a large italic *w*. Superposed above these four ranges of tubes are three drums, set at slightly different levels; the water surface being highest in the rearmost one. The inclined tubes connect these with two mud drums at the base; and all the series of drums are connected together by short curved tubes. The water is taken in at the coolest part of the boiler—that is, at the top of the rearmost drum; the furnace being situated at the other side. The water passes down the back row of tubes into the first mud drum; and in this first part of its travel, it relieves the escaping furnace gases of their last available heat. In the first mud drum, any mud and scale-forming constituents contained in the water are deposited. The water then passes over to the lower front drum, and afterwards gets into the general circulation of the boiler where the heat is greatest, and steam is generated. The circulation of the water is very rapid; the increase in the rate of speed being very much in relation to the temperature of the gases by which the various banks of tubes are surrounded—the greater the temperature, the greater the rate of travel. The steam is taken off at the top of the middle upper drum. The back part of the boiler acts both as a heat economizer and a purifier; but should any scale be formed, the Company have produced a very ingenious tube cleaner, which is rapid and perfect in action. Tube repairs are also easily effected. Spare straight tubes are supplied, which can easily be brought to the requisite shape by means of a bending block. Altogether, we think the claims of the Stirling boiler to be an economical and effective steam raiser, and comparatively cheap in respect of first cost, will not be found to be exaggerated.

No gas engineer will miss an inspection of Messrs. W. C. Holmes and Co.'s exhibit at Stand 15. Its principal feature is a small rotary scrubber-washer fixed complete for working; the capacity being 50,000 cubic feet of gas per day. An 8-inch Pelouze and Audouin tar-extractor is on view; and then a patent 10-inch duplex valve will not go unobserved. It has this distinctive feature, that by its use with two purifiers they can be worked either one or both together or one singly, or both be by-passed. An improved self-sealing mouthpiece, 15 in. by 26 in., is also shown. A point about it is that it is adjustable for taking up the wear and tear on the lever, thereby preventing sagging of the door with constant opening. There are also two double-faced valves—24-inch and 10-inch—which possess the advantage that, when closed, they can be cleaned without loss of gas. Then a disc valve is shown with, instead of a flat-faced disc, a cone-shaped one. It is needless to refer to the general appearance of this firm's productions; they are too well known to need commendatory remarks. In connection with their stand may be seen at work one of Keith's small gas compressers, which supplies gas for the lighting of the stand with Keith's high-pressure burners and the Guaranty Company's "Dura" mantles.

The high-class workmanship put into their work by Messrs. George Waller & Co. is illustrated at Stand 17, where will be seen the firm's patent combined gas exhausting set with gas-engine, and another set

with steam-engine. Examination is also invited to a small coke-breaker and to an example of the "Phœnix" direct-acting steam tar and liquor pump. Photographs of different portions of apparatus are also exposed to view.

Gas-Works Material and Requisites.

Some of the exhibits in this class we have not yet had an opportunity of examining; and therefore, for the present issue at all events, we can only give an indication of the promised character of such of those as we have not seen, from the official catalogue. Taking the names as we have mentioned them, the exhibit of the Eerste Hollandsche Yzerts and Maatz, Rotterdam, consists of bog ore or oxide of iron for gas purification. The United Asbestos Company, Limited, call attention to the new C. & B. Salamander gas-engine oil, the A1 Italian millboard for gas engine joints, and fuel and floss for gas-fires. The Lanemark Coal Company are entered for a display of various classes of coal. Mr. Thomas Bigden has a good selection of gas-works necessities, such as gas-bags for main repairs, inflating bellows, stokers' mitts, tar and liquor hose, well dresses, tarpaulins, india-rubber valves, washers, &c., machine bands, brass and gun-metal cocks, branches, &c., and cotton waste. The number of the stand on which this assortment of goods is shown is 25. Stand 29 is down for occupation by the Tibbington Collieries and Brick-Works, Limited, with fire-bricks, and by Messrs. Lee, Howl, and Co., Limited, with patent boiler composition. The exhibits of the Clay Cross Company are stated to be fuel economizers, cast-iron gas-pipes, &c., gas coal, and lime for purification. The Consolidated Petroleum Company have on view a model of a tank steamer, water-gas plant, railway-tank waggon, samples of gas oil, &c.; and the Silica Fire-Brick Company present for inspection samples of their well-known silica fire bricks and blocks, ganister bricks and blocks, and silica and ganister cements.

Gas-Meters.

On two stands in prominent positions, Messrs. Thomas Glover and Co., Limited, and Messrs. R. & A. Main, Limited, make combination displays of their respective productions, which bring to the general public gaze once more undeniable evidence of a continuation of that high reputation which each firm holds for excellent work. But we can only deal with Messrs. T. Glover and Co. under this head. The firm was established about 57 years ago; and really they have made for themselves in that period a notable history. Their rise has been commensurate with that of the gas industry. One of their exhibits on Stand No. 1 is a test holder equipped all ready for work, precisely as for an official meter-testing station. A 500-light meter is another feature; and a speciality is a 100-light meter (known as the key meter), which will be found of immense advantage for adoption in large establishments. It can be fixed for the passage of any given quantity of gas. By means of a key, the consumption can be set by a pointer traversing a dial; and then if the amount is not used, by means of the action of a lever the balance between the set consumption and that actually consumed can be ascertained. By its means extravagant consumption can be obviated in large establishments. Among a collection of meters of all sizes and kinds will be seen some experimental meters; and in a noticeable position is a 5-light dry meter which was made in the year of the birth of the firm (1844), and, after being in use for 57 years, it was still found by test to be capable of rendering accurate service. This is a tangible testimonial worthy of preservation. An old pet of the firm is again brought from its customary resting-place. It is the meter, in a glass case, which took the first prizes at the Exhibitions in London in 1862, in Dublin in 1865, and in Paris in 1867. A useful appendage to a gas company's office equipment in these days of slot meters is the new coin counter, by means of which succeeding five shillings' worth of pennies can be counted rapidly and accurately. This useful invention has quickly found users; among the gas companies in the south who have adopted them being Eastbourne, Hastings, and Brighton.

On stands 32-34, the Richmond Gas Stove and Meter Company include among their exhibits some of the manufactures in meters of the old firm of Messrs. George Glover and Co., Limited. A prepayment meter will also be found in operation there.

Messrs. Alder and Mackay are entered for an exhibit of gas meters and apparatus; but we did not come across a stand bearing their name on Saturday. Nor, if then existing, did we have an opportunity of inspecting the Liverpool and London Meter Company's stand. But we hope to have the pleasure of doing so during the week.

An opportunity is afforded for a complete examination of Greenall's "Positive" Meter at Stand 46; and when visitors learn that Mr. Thomas Newbigging has reported that the meter "combines the advantages of both the wet and dry meters, without any of the deficiencies of either," they will stop to make an examination, which can be satisfactorily and indeed freely done. There are three meters on the stand, one being in a glass case; and all the various working parts are displayed separately. The features and claims are that the meter has two metal measuring cylinders, which do not change their form or dimensions, as do the diaphragms of the existing dry meter. Each of the cylinders is divided into two separate chambers by a hollow cylindrical piston sealed with glycerine between the inner and outer parts of the cylinders. Each of the four chambers is connected by gas-ways to its respective valve port. The length of the stroke of the piston is (after correct adjustment) fixed and definite; and therefore the displacement of gas at each stroke is positive and unvariable. The measurement depends entirely upon the length of stroke at which the pistons are adjusted and fixed; and it will not be affected by any subsequent variation of the height of the glycerine seal-line. The meters are being made of rather heavier material than is usual in dry meters.

Messrs. Schofield and Co. exhibit, at the adjoining stand, their newly invented detachable diaphragms, which, seeing that the improvements are illustrated and described elsewhere in this issue (p. 1598), do not need more than a bare mention here, in order that visitors may make a point of taking this opportunity for inspection.

Incandescent Gas Lighting and Fittings.

The exhibition is beautifully illuminated by Keith's system of high-pressure gas-lights, arranged in clusters in ten lanterns suspended down the centre of the transept. This and other illustrations of high-power gas lighting should be of considerable benefit to the gas industry in its struggle for a continuance of supremacy as a lighting agent.

The stand of the Welsbach Incandescent Gas-Light Company stood as a reproach to them on Saturday. Though foremost (as the makers of the Welsbach mantle) in incandescent gas lighting in this country, and with unrivalled resources, their stand was still in course of erection. But they are evidently preparing for an attractive display; and we shall look with interest for the consummation of their plans.

The tenants of Stand No. 58 are the Inverted Incandescent Gas Syndicate, Limited; and no one will visit the exhibition without making an inspection of this novelty in incandescent lights, which is at once particularly adapted to decorative purposes as well as promising of useful employment in certain situations. It certainly challenges the decorative claims of the incandescent electric light. Some difficulty has hitherto been experienced in getting a bunsen burner to burn downwards on account of its liability to light back; but by means of a specially adapted cone, this has been overcome. The burner is fitted with a regulator for the supply of gas; and is attached to a cone of white china or other suitable material, which acts both as a radiator and reflector. The consumption of gas is about 3 cubic feet an hour; and the illuminating power is given as 45 candles. The mantles are very short, and have a stunted appearance after one has become accustomed to the ordinary shaped ones. They are attached to the cone by means of a bayonet ring. The mantles, we are informed, have very good lasting power, though suspended. A test of one showed a life of 486 hours' continuous use before being accidentally broken; and it is said that there is no reason why they should not have a duration of considerably more than this. Special fittings are made for these burners, but they can be readily adapted to existing fittings. Their shadowless property will make them of service in billiard rooms and other situations where shadows are a disadvantage. Altogether we are exceedingly pleased with the light, and with the show the Company are making.

The stand of Moffats, Limited (No. 60), will be a centre of great attraction. They are exhibiting the Lucas incandescent intensive gas-lamp; and truly the lamp does not calumniate its description of "intensive." The display of light at the stand is, in fact, remarkable; and with a number of the lamps alight, the intensity of illumination is discomforting and almost blinding. The lamp is constructed with a long chimney above the mantle; and at the bottom of the chimney a junction with the glass is effected—the intensity of illumination being obtained by the natural rapid draught induced by the arrangement, and the perfect admixture of the gas and air which the burner is said to produce. With a consumption of 17 cubic feet, the illuminating power is placed at about 700 candles; and we do not doubt the statement. A specially large mantle is required; and those used are of the kind known as the "Perfect." For outdoor lighting and large interiors, the lamp will undoubtedly bring to itself a demand. It is used in Berlin; and there are a few examples, we believe, in London. A lamp-column, 27 feet in height, such as is used for these lamps in Berlin, is one of the other interesting features of the stand.

By this time, we believe, Messrs. Lovell and Co. have their stand (No. 61) equipped with self ignitors for incandescent mantles for public lighting, or for installations where control is desired from one tap.

Gas Fires and Stoves.

The goods of Messrs. Thomas Glover and Co. on the stands to which we have already referred have as companions a good collection of the manufactures of Messrs. R. & A. Main. Cooking-stoves are there in great variety; and so are gas-fires. A new line with the firm is some attractive fires for halls and such-like places. The gas-fires fitted with glass lights for diverting the heat in any direction will be observed by the visitor. In excellence of finish and style, the firm evidently do not intend to be excelled.

Messrs. Ritchie and Co., at Stand 8, exhibit some of their newest designs in the "Lux Calor" stoves; and in richness of ornamentation, the principal ones shown are certainly good. We have recently drawn attention to these stoves, and illustrated one pattern; but to be fully appreciated they must be seen.

Stand 31 is in the possession of the "Economy" gas-cooking stove; but it was too incomplete on Saturday for a fair note to be made of the exhibits.

The space covered by the Richmond Gas Stove and Meter Company, Limited, embraces Stands 32-34, and so exceeds in magnitude any other exhibit in this section. The boldness of the display is quite a feature. In heavy goods, a triple cooker, known as the "Windsor," will attract notice, as will also a double cooker, and a large 6 feet carving-table with overhead gear complete. The "Monarch" water-heater is an appliance by which a continuous supply of hot water can be obtained; the simple act of turning on the water also turns on the gas, which is ignited by a pilot jet, so that the gas is only burning while water is being drawn. This is a very economical arrangement. One of the inconveniences in kitchen service where gas cooking-stoves are used has been the absence of a hot-water supply; but the firm has secured a contrivance which overcomes this difficulty. It is known as Parish's patent boiler; and it is attached to the side of a cooker. The feed to the boiler is continuous, and the supply of hot water is the same. We will take an early opportunity of describing this ingenious arrangement. The several improvements in the firm's gas-fires have been lately noted in our columns; and the stoves containing those improvements may all be inspected. Chief among them to claim attention will be the "King Edward" and the "Triumph" fires, and the "Dragon" condensing-stoves. The firm's gas-fire water-gas attachment, the removeable fronts, fire-bricks, burners, and panelled sides, the hidden water evaporating pan, and the draught regulators are all points which may interest the inquirer. The stand is illuminated with Welsbach lights, and its attractiveness will bring to it a large share of notice.

For the short time that the Imperial Stove Company have been in existence, it must be conceded, after examining the character of the goods they present for view at Stands Nos. 35 and 36, that they are moving along the right track for courting favour. In fact, they assure us that they have so far met with very satisfactory success. Their gas-fires give evidence of great care having been bestowed upon the

making of the patterns; and the Company have fitted up their premises for first-class work. In respect of quality, shape, and finish, it is manifest that they intend to compete on a level with the older makers. In the cooking-stove line, one of their specialties is a strong stove for use in connection with slot cookers. It is produced in three sizes; all parts are made interchangeable; and the oven burners are so fitted that, by releasing two screws, the supply jets can be taken out.

The Wright and Butler Manufacturing Company Limited, have a large and attractive assortment of gas cooking and heating stoves on Stand 38; one of the leading features being the new "King" condensing stove.

In visiting the stand of the Cannon Iron Foundries, Limited, the visitor will note the porceliron linings to the ovens of the cooking-stoves, which the makers claim will last the lifetime of the stoves, so reducing maintenance to a minimum. They pride themselves on their slot cookers, of which the porceliron linings is a feature. In regard to gas-fires, they are well equipped for competition; and they seem to have secured a point with their "vitrolustic" enamel, the brightness of which, they inform us, even on the ornamental front retaining the fuel, is unaffected by the heat. This new enamel is produced in various colours. A prepossessing fire is the "Victory." It is supplied with a patent cellular brick at the back, to the use of which is attributed a good increase in the incandescence of the fuel, by securing the combustion of certain gases which are lost in an ordinary fire. However this may be, the specimen of the stove exhibited at the Crystal Palace presents a solid incandescent body of fuel, and its radiating power is deserving of mention.

In close proximity to the last-named stand will be found the exhibit of Messrs. Clark and Co. Their patent "Syphon" hygienic condensing gas-stoves and "Syphonette" series are too well known to need any special mention. Their good qualities as heating agents and their artistic finish have made them deservedly popular; and looking at the display made at the Palace, they are likely to continue so.

One of the best positions in the exhibition is occupied by the Kern Burner Company, whose stands are numbered 41 and 42. The show they make with the Clamond gas-radiators is a singularly attractive one. The perforated tubes in front (in place of the ordinary fuel), the portability of the smaller sizes of the stoves, their adaptability to various situations, and withal their pretty appearance, strongly appealed to the public eye on the day of opening. A prepayment meter attached to a small five-tube stove shows that, for the expenditure of 1d., the stove can be kept going for three hours. About twenty different designs of these newcomers are shown in various colours.

This completes our notice of the exhibition, with the exception of the few stands which, as we have explained, through want of time or incompleteness, we are unable to deal with this week. However, we have said enough to make it quite clear that all sections possess meritorious features, which will impart interest to a visit.

THE OPENING DINNER.

The opening of the exhibition was signalized by a dinner in the evening in the Garden Hall of the Palace, Mr. W. R. HERRING, the President of the Institution of Gas Engineers, occupied the chair; and Mr. CORBET WOODALL was the principal guest. In the absence of Mr. S. W. Durkin, the President of the Gas Institute, the vice-chair was filled by Mr. ERNEST SCHENK, the Chairman of the Crystal Palace Company. The diners numbered about eighty, including the exhibitors and many gas engineers—Ireland being represented by Mr. F. T. Cotton, Scotland by Mr. Herring, and England by several.

The dinner was well served; and at its close a short toast list was gone through. The loyal toasts having been honoured,

Mr. W. J. DIBDIN proposed the toast of "The Gas Industry." Having spoken of its magnitude, he referred to the severance a few years since of his intimate relations with the gas industry, which enabled him now to take an independent survey of it. Looking back a few years, he reminded those present of the exhibition of 1882-83 which was held in the Crystal Palace under such magnificent auspices. That was an exhibition which, in the history of public lighting, had never been rivalled. It was an exhibition at which the new-born babe—electricity—took one side of the Palace, and the other was devoted to the gas industry as it then stood. They had now arrived at a point when these two competing systems had grown in power to such an extent that electricity took its own stand, went its own road, and left the "poor old" gas industry to stand alone. But the gas industry had something of youth about it yet. In passing, he reminded his hearers that he had charge of the first public installation of electric light in this country—the Jablochkoff system on the Thames Embankment in 1880. Then he alluded to the fact that at the time of the 1883 exhibition the earliest developments of the incandescent gas-light had been given to them in the form of the Clamond burner; while at the present day they had the Welsbach mantles and the modifications and amplifications of that system, in high power burners, and improvements of that sort. With these, they had now a condition of things which gave gas lighting and the gas industry a new development. Cooking and heating by gas was also in an infant stage at the time of the previous exhibition; but to-day gas-stoves were found in the house of every friend. Electricity had its own peculiar and valuable functions; and in his view gas and electricity would run side by side for many a day to come. He coupled with the toast the name of Mr. Corbet Woodall, whose valuable help to the gas industry he did not forget to recognize.

The toast was enthusiastically drunk.

Mr. CORBET WOODALL, in responding, said he was proud there or anywhere to have his name associated with the gas industry. The gas industry was not only one with which one might be proud because of its great importance from the point of view of capital invested and labour employed, but he regarded it as an industry of particular interest because he knew of none in which the raw material was accounted for with such completeness as it was in their industry. It was a common idea with regard to gas—and he was inclined to say the appearance of some gas-works justified the idea—that it was a very rough and rude and dirty business; and yet, regarded as a scientific industry, he knew of none superior to it. Mr. Dibdin had spoken of the exhibition of 1883. At that time, they looked upon the show with a certain amount of pride. It was very well done; and it was certainly a most interesting and valuable exhibition. They regarded the industry then as a very great one; but let them compare it with what it was at that time and with what it was now! At that date, the utmost development in lighting was that of regenerative burners, which came at an opportune time, and were of some value in the contest just then taking place with their friends the electricians. But to-day the regenerative gas-burners of that period were as dead as Queen Anne. He remembered the first discussion which took place on electric lighting at the Institution of Civil Engineers in 1878 or 1879. At that meeting, Sir William Thompson as he was then (Lord Kelvin as he is now), with that seductive optimism which still characterized him, spoke of the time when gas-works would cease to furnish gas to their towns, and when gas-mains, if they existed at all in the roads, would be there simply as conduits for electric-light conductors. Following Sir William, he (Mr. Woodall) ventured to say that he thought the years to come would probably see as much advance in the economy of the production of gas as it would of electricity. He took a mild pride for suggesting that, until the electric light was capable of greater subdivision than it was then, it would not compete with gas to any extent. That was in the days before the glow lamp. He further suggested that he could more easily imagine the erection of works for the purpose of distilling coal for the other products of coal, in which gas would in fact be the bye-product, than he could the entire banishing of gas-works. Now what was the condition of things to-day compared with then. He had remarked before that he was often surprised to find it difficult to realize how modern, how very modern, the gas industry of to-day was. The gas supplied to London only had considerably more than doubled since the days when they were being threatened with possible extinction. The gas supplied to the suburbs of London had increased by more than three times, and in some cases even four times; and he never knew the time when the increase was at a greater ratio than, or as great a ratio as, it was to-day. He need not tell those present that this was not because the anticipations of their electrical friends in those days had not been realized. He agreed entirely with Mr. Dibdin, and had always agreed with the sentiment, that there was an abundant field for electric lighting; and there was no doubt whatever that to a large extent the electric light had taken the place of gas for lighting. But when one knew, as one did, that the comparison to-day, with the help of such lights as were to be seen in the exhibition, without the advantage of high pressure or anything of the sort, was in the ratio of 7 to 1 in point of cost, they were not afraid that, in the sphere of lighting, gas would not have a career of long duration. But the other applications of gas that had grown up and developed to so great an extent since those days, were of a still more striking character. The application of gas for power purposes was now, he should say, ten times what it was twenty years ago. The introduction, too, of the prepayment system had increased the number of consumers to a degree almost beyond belief. His friend Mr. Broadberry could tell them that the increase in his district in the North of London had been, in the course of six or seven years, more than it was in the whole fifty years of the existence of his Company before. In the Palace that day, they were reminded, by what they saw around them, of the immense number of applications of gas for purposes of domestic utility; and yet he thought he could, in the presence of those who had been such valued allies in the industry as manufacturers of apparatus, complain of one or two deficiencies. For example, the methods of circulating hot water for domestic use in their houses had been sadly neglected by manufacturers. If is was true that "calamity is man's true touchstone," he thought they might say of the competition which came into the business twenty years or so ago that it had been a "blessing in disguise." He was proud to have been for a great many years associated with those who had had the conduct of gas undertakings, and the son of one of those who were engaged forty years ago in that direction Though they might have been open in the past to the reflection that had attached to the monopolist, he trusted they had learned their lesson, and were more disposed to say to those who were dependent upon them for supply, "What can we do in order to help you, or to be of real service?" They had been singularly aided by the inventive genius of such men as Welsbach and others. With regard to the relative positions of gas and electricity, his friend Mr. Herring had just told him that in the city of Edinburgh there were £700,000 of municipal capital invested in electric lighting; and there was invested in gas lighting about £1,500,000. But the amount of lighting done by gas was about ten times that done by electricity. He (Mr. Woodall) did not dispute that the light supplied by the Electrical Department was not worth the money; but those figures gave them some idea of what the field was which had to be supplied by both. Again, the Engineer of the Brighton Gas Company told him a little while ago that when the electric light was first introduced into the town, the Gas Company felt a distinct diminution in the quantity of gas supplied; but as the years went on, and the town became practically saturated with the electric light—that was to say, when those who were able to afford it, and to whom the opportunity was given, had obtained their supply—the balance was redressed, and now the increase in the gas consumption was as large as it ever was before. Regarding the exhibition, the gas companies had at any rate every reason to wish it success. They were sure to be benefited thereby. He believed that in some respects they were rather at the beginning than the end of their career; and one would venture to suggest that this was supported by the continued readiness of municipalities to acquire the undertakings of gas companies, providing always they were paying maximum dividends. But, as he had said, many of them had followed fathers who were engaged in the industry. Some of them were handing down to their sons the same calling; and he did not think that those who had done so need regard with any fear the possibility of reproach by-and-bye. They were happily advised; and he did think that in the time to come, they would hand on this great industry to those who followed them—prospering and to prosper.

Mr. SCHENK proposed the toast of "The Exhibition," and, in the course of his remarks, promised that, if the gas apparatus manufac-

turers took up an exhibition with enthusiasm in the next or following years, he and his colleagues on the Board of the Crystal Palace Company would give them every possible support and attention. Appropriate response was made by Mr. JOHN GLOVER as representing the exhibitors. Following him, Mr. J. W. HELPS proposed the toast of "The Press," which was cordially honoured. In a speech in which he thanked all who had assisted him, Mr. HERSEY stated that he hoped, with the consent of those engaged in the gas industry and of the Directors of the Crystal Palace Company, to organize another exhibition. He concluded by proposing "The Health of the Chairman." This was very heartily endorsed by the company.

Mr. HERRING said that he must thank those present for the cordial manner in which they had received the toast. He could assure them that he had felt considerable pride in having been called upon to preside at the banquet. He might say that he accepted this exhibition rather as an example of what could be; but he did not think, as engineers representing the profession of gas engineering, they could accept it as an altogether adequate exposition of what the gas industry is. He thought they should act upon the hint which the Chairman of the Crystal Palace Company had thrown out, and take an early opportunity of organizing an exhibition in the near future—giving the contractors full time to prepare their plant and appliances—so that the public might not only be enlightened by showing them how to burn gas, but let them also interest the public in the many and varied methods which had to be employed in its manufacture. As Mr. Woodall had very aptly put it, there was no other industry in which every atom of the products was employed and was turned to such useful account as in their own; and he thought they might with advantage show these things to the public, and interest them in their work.

With the Chairman's speech ended a very pleasant evening.

CARLISLE GAS AND WATER WORKS MANAGEMENT.

Separation of Offices.

At the Meeting of the Carlisle Town Council last Tuesday, a resolution of the Gas, Water, and Baths Committee, dealing with the reorganization of the management of the Gas and Water Departments, was under consideration. The resolution was to the effect that the Chief Accountant (Mr. R. A. Clarke) be appointed Gas and Water Accountant and Deputy City Treasurer; that in future the administration of the Gas and Water Departments be separated, and a Gas Engineer and Manager advertised for; and that the management of the water supply be transferred to the City Surveyor (Mr. H. C. Marks).

Mr. CORBETT, in moving the adoption of the resolution, said that Mr. Clarke was well up in the accounts, and they could not have a better servant. With regard to the gas-works, it was obvious that they must have a Manager of some kind there; and they thought it better to have separate Managers for the gas and water works. For a long time—he dared say from their commencement—the water-works were in the hands of the Corporation, and were managed by the City Surveyor; but a little over twenty years ago, from certain circumstances which occurred then, they were attached to the Gas Manager. He thought it was a mistake to have done this. However, there was now a chance of remedying it; and they proposed that the Council should take the management of the water-works from the Gas Manager, and place it in the hands of the City Surveyor. Mr. Marks was responsible, and would continue to be responsible, for the proper maintenance and the condition of the streets. They found almost daily that the streets were broken up by the gas men, and put down again in a rough state. They also found that no sooner had the gas men gone away than the sewerage men came, and did that which the gas men had done, and that they were followed afterwards by the electric light men, who also did the same thing. The inconvenience arising from a system which permitted such things would be obviated in future. The gas people and the electric light men, when they had anything to do in the streets, would give information to Mr. Marks, and by that means they would be able to keep the streets in a better state than had been possible under the old method.

Mr. COULTHARD seconded the motion, which, after considerable discussion, was carried.

Strike at Merthyr Gas-Works.—The stokers in the employ of the Merthyr Gas Company came out on strike last Friday for an eight-hour instead of a twelve hour shift. It is stated that new hands have been imported from a distance, and that operations at the works are proceeding as usual.

Omagh Gas-Works Purchase.—The result of the poll which was demanded at the conclusion of the ratepayers' meeting held to consider the question of the purchase of the gas-works by the Omagh Urban District Council, has been announced, The figures were: In favour of the purchase, 433; against, 205. The Bill will therefore be proceeded with in the next session of Parliament.

Leeds Gas Workers and Sunday Labour.—It was stated in the "JOURNAL" last week (p. 1543) that the Leeds City Council had passed a resolution to the effect that in future the men be not allowed to work more than six shifts per week, that the wages of stokers, firemen, coal-wheelers, drawers, machine attendants, and cinder-throwers be increased by 4d. per shift, and that time-and-a-half be paid for Sunday work. These terms, however, have not been accepted in their entirety by the men; and on Friday a conference took place between the Gas Committee and the men's reresentatives. The main difficulty appears to be in regard to Sunday labour. While the men have no objection to be restricted to six shifts (which will mean employment for a hundred more men), nearly all of them want their day off to be the Sunday. As a result of the conference, it was agreed that the General Manager (Mr. R. H. Townsley) should draw up a statement showing how the new scheme was likely to affect the men—how many times a man will be called upon to work on a Sunday within a given period. When the report is ready, another meeting will be held to consider the question.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Strike at the Italian Stations.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 7, Drapers' Gardens, Throgmorton Street, E.C. Mr. FREDERICK TENDRON, who presided, opened the proceedings by stating that the Chairman (Mr. Arthur Lucas) very much regretted his absence. Later on, when proposing a vote of thanks to Mr. Lucas and M. Salanson, the President of the Union des Gaz, he would explain the cause of the absence of the former.

The SECRETARY (Mr. F. W. Himing) read the notice convening the meeting, and afterwards the following report of the Directors, together with the balance-sheet:—

The Directors have to report that at Messina and Montargis—the two stations owned by the Continental Union Gas Company—the increase in the number of consumers is about 5 per cent.; the increase in the quantity of gas sold being, however, only about 3½ per cent. This is chiefly due to the increased use of incandescent burners, which has the effect of reducing the consumption.

The net sum spent on capital account at these two stations during the year amounts to £756; being almost entirely for additional mains, lamps, and services.

With regard to the Union des Gaz, the total debited by that Company to capital account for work completed during the year amounts to £62,980. This includes purchases of land at Alessandria, Beaucaire, Milan, Roanne, and Rueil; also new regenerative furnaces at Genoa and Strasburg, new gasholders at Milan and Rueil, and new mains, lamps, and services at the stations generally.

The average cost of coal has again increased. On the other hand, the selling prices of coke and tar have risen considerably.

There has been a net increase of 479 in the public lamps. The number of private consumers on the books of the Union des Gaz on the 30th of June last shows a further increase of 10,778, equal to about 8 per cent.; making a total of 148,198 consumers now supplied with gas by that Company.

The quantity of gas sold shows an increase of 7 per cent.

The rate of exchange on remittances from Italy has shown a further improvement, and is at the present time more favourable than it has been for many years.

The Union des Gaz have again increased their dividend, this year by 1 per cent.

Referring once more to the accounts of the Continental Union Gas Company, Limited, the increase in the Union des Gaz dividend alluded to above will enable the Continental Union Gas Company, Limited, to maintain the same rate of dividend as last year, and to show a surplus on the year's working of £6928. The Directors have therefore decided to transfer a further sum of £5000 to reserve fund, adding the balance of £1928 to the undivided profits carried forward.

The net profits for the year ending the 30th of June last, after transferring the £5000 to reserve fund, amounted to £81,798. From this the Directors recommend a dividend of 9 per cent. per annum on the ordinary stock, free of tax, and of 7 per cent. on the preference stock, less tax.

After deducting the interim dividend paid in July last, and paying the balance of 5 per cent. on the ordinary, and 3½ per cent. on the preference stocks, the total amount carried forward to the new account will be £14,494.

It is proposed to pay the dividend as usual on the 4th of January next.

The Director who retires by rotation is R. S. Gardiner, Esq., and the Auditors A. T. Eastman and I. A. Crookenden, Esqs., also retire—all of whom, being eligible, offer themselves for re-election.

The CHAIRMAN said that, by the balance-sheet and statements the proprietors had had read to them, they would have gathered that the bulk of the capital of the Continental Union Gas Company was in the shares of the Union des Gaz; £739,000 of a capital of £940,000 being invested in the shares, and about £62,000 in the bonds, of the French Company. This proportion of the capital was so large that the proprietors would readily understand that he preferred dealing, in the first instance, with the financial position of that Company. Some of them held the shares and bonds of the Union des Gaz; and many of them were more or less well informed of the nature of the relationship existing between the two Companies—that it was originally to find the money that was necessary to enlarge the works at the various cities of the Union des Gaz that the Continental Union Company was started, and that they received payment in shares of the former Company for the monies they advanced to carry on those works. Dealing with that large sum of £739,000 out of the £1,000,000 of capital, and also seeing that the Union des Gaz had no less than £857,584 of obligations, and that, after deducting £431,476 from the cost of the works at the different cities, an expenditure had been incurred of no less than £1,756,581, they found the unexpended capital of the Union des Gaz was only £101,000. If they added to this the reserves that had been put by during a series of years of £266,315, and compared the two sums with the amount of stock that it was necessary to hold at the different cities, and which, in the balance-sheet of the Union des Gaz, reached to no less than £495,374, it would be seen that, not only was it impossible for the administrators of the Union des Gaz to invest their reserve fund in separate securities, but that they had to rely upon the current profits to find the money that was necessary to enable them to keep the large stocks that their concessions required them to maintain at their various cities. Therefore the proprietors would readily understand that, as the expenditure was constantly going on (as the report stated, £62,980 of work had been completed during the past year at the stations of the Union des Gaz, £63,000 of work was still in hand, and at the great stations of Milan, Genoa, Strasburg, and Rueil, extension was always proceeding), it was necessary to raise more capital. If the works were not extending, if the consumption were not increasing, there would be no demand for more capital. It was the success they met with at their various stations that rendered it necessary to raise this additional capital. At the Paris general meeting, it was decided that the further issue of capital should take the form of obligations—as was so general now in water companies by debenture stock, and in the great companies in France by obligations. They had received from the Paris Secretary a form of the application that would be made, and an inquiry whether any shareholders of the Continental Union would like to take a share in the

issue of these obligations. Briefly expressed, the obligation would carry interest, after deducting the French tax, equal to 4 per cent. From this they must deduct income-tax, and they must bear in mind the fact that the interest would have to be remitted in French money, and therefore that there would be a loss upon it; so that the investment would not give them quite a clear 4 per cent. But it would return the holders, roughly speaking, 3⅞ per cent. It was, however, a first-class security, although not so very readily negotiable; for they could not get very negotiable securities to give as high a rate of interest as 3⅞. If any shareholder, either present or who might read the report of the meeting, desired to have his name put down for a large or small amount in these obligations, he would perhaps be good enough to communicate with the Secretary. The trade position of the Union des Gaz was a reasonably good one. The stations were all amply supplied with coal (which was a vital point); and they had large contracts still outstanding at very reasonable prices. It was true that during the past year tar and coke commanded a higher price in the market, but in the present year the residuals would probably realize lower prices But against this they had low freights, and an improvement in the Italian exchange. He read in that morning's paper—either in a speech or in a report from the French authorities on French finance—that almost the only country in Europe now that had an equilibrium in its Budget was Italy. That to the Company was of very great importance—not only in the matter of the rate of exchange, but from their natural sympathy with the Italian Government and people. Anything that indicated prosperity in Italy met with the greatest satisfaction on the part of the Directors, and he might say also on the part of the shareholders. Now with regard to the Continental Union, it was such a natural thing for the shareholders to say: "Well, but if the Union des Gaz declare a dividend of 12 per cent., why should we only have 9 per cent?" They had to bear in mind that, when the French Company declared a dividend, they did not, as in the case of the Continental Union ordinary shares, declare it free of income-tax. From the 12 per cent., had to be taken the French tax, then the loss on exchange, and, finally, the English income-tax, for no Chancellor of the Exchequer ever studied the unfortunate shareholder, no matter what the nature of the Company might be. The result was that the nominal 12 per cent. came down to 10¾ per cent. This was one reason; but then the proprietors might say: "After all, if you get 10¾ per cent., why can we not at all events have 10 per cent.?" There was another reason. When an English Company was very strong financially and had £80,000 of its capital unexpended, they must do something with it. It was in vain that they sought for many years investment in some other gas-works. Gas-works were not to be had easily; and those which were offered to the Directors were at such a preposterous price that there was no likelihood of getting an adequate return from them. Still, the surplus had to be invested, and £60,000 was in the French obligations (on which they barely got 4 per cent.), and the rest, being on deposit, brought them in a smaller sum. But taking it all round, on the £80,000 surplus capital, they received interest amounting to £3252, which was equal to 4 per cent. Still, 4 per cent. was a very different thing to the 7 per cent. they had to pay on the preference shares, and the 9 per cent. they paid, free of tax, on the ordinary shares. Their own stations—Messina and Montargis—gave between them a return on the capital invested of 8 per cent., which was midway between the 7 and the 9. This proportion, however, was not maintained, because the ordinary stock capital of the Continental Union Company was £740,000, against £200,000 of preference; and they wanted a larger sum than 8 per cent. to equalize the dividend between the two. Thus the proprietors would see, firstly, why they could not have a higher dividend, and, secondly, why the dividend this year was not in proportion to the increase was because of the additional tax—especially now that they were to pay an income-tax of 1s. 2d., which really gave a percentage upon the dividend, so that the proprietors were really obtaining a slight fraction over 9 per cent.—and, again, because, seeing so large a proportion of the surplus money was in the security of the Union des Gaz (although it was the most improbable thing in the world that difficulties between England and France, or France and Italy, would arise), it would be recognized that an English Company should have a fairly large reserve invested in English securities. Therefore, he was sure, the proprietors would support the action of the Board in transferring £5000 from the revenue of the year to the reserve fund; and it was the intention of the Board that every sum carried to reserve should be in liquid securities and English securities. After taking that £5000, as the proprietors heard, there would be a balance carried forward in excess of last year; and it would now amount to £14,494. He thought it would be satisfactory to the proprietors to know that at the Paris quotation price—he did not mean to say a large quantity of shares could be sold at that price, and he was sure very few could be bought at the Paris quotation of the Union des Gaz shares—the value of the assets, which stood in the balance-sheet at £739,000, was no less than £1,600,000. He thought this supplied a volume of encouragement to the shareholders of the Continental Union Company. He did not think there was anything more upon which he could address the proprietors, and in which they would be particularly interested; and therefore he would content himself by moving the adoption of the report and accounts.

Mr. N. E. B. Garey seconded the motion, which was unanimously carried.

On the proposition of the Chairman, seconded by Mr. R. Hesketh Jones, the dividends recommended in the report were also unanimously declared.

Moved by the Chairman, and seconded by Mr. J. Horsley Palmer, Mr. R. S. Gardiner, the retiring Director, was returned to the Board; and subsequently, on the proposition of Mr. E. Felix White, seconded by Mr. R. G. Cooper, the Auditors (Mr. A. T. Eastman and Mr. I. A. Crookenden) were re-appointed – their fees being voluntarily raised to £105 each per annum.

The Chairman said he had to thank the proprietors sincerely for the confidence they had placed in the Board. Not one question had been asked, although many of them must have read about the strike at the Italian stations of the Union des Gaz. At Milan, Genoa, and Alessandria, they had had a strike for which the Directors were in no way responsible. He was not going to say much upon the subject beyond this, that they received notification not from their men, nor would he say from an agitator, but from a professional gentleman who took up, philanthropically possibly, the cause of the Company's men. The Company had done the best they could at all times for them. Every Director who had gone round to the stations had been animated by a kindly feeling towards the men, and whenever a Director had had an opportunity, he had done what he could to ameliorate the condition of their employees. At Alessandria only two months before the strike, their wages were raised; and there was also an increase a year before at Milan. Then almost categorically, they were summoned, in a long printed pamphlet, to grant the demands of the men, and were required to give an answer in a very short time—six days. They received the demand on Nov. 14, and an answer was to be given by the 20th. The Directors telegraphed that the demands of the men were under consideration. It was hard, however, to believe that, even a professional agitator, instead of calming the men, and telling them their claims were under consideration, should have instigated them to leave their work, and to throw the cities into darkness. Fortunately, their Managers rose to the occasion; and they brought in men from the surrounding country, and did everything they could to give the inhabitants, if not a perfect, at all events an imperfect supply during the hours of night, when the cities might have been in danger from the wicked action of the leaders of the men. The men themselves, he was confident, would never alone have acted like that. The Directors had been kind to the men from the commencement. Voluntarily they had given them pensions; and they had always taken into account exceptional circumstances when appeal had been made for kindness or consideration. Therefore the Company did not deserve such treatment. However, when the strike took place, and the agitation was at its height, when the Prefect and the Syndic met the Company's Manager, and every desire was shown by the authorities that an arrangement should be come to, Mr. Lucas, the Chairman of the Company, and M. Salanson, the President of the French Company—at great inconvenience to themselves—decided that they would go out, with full power to settle the difficulty. It was left entirely in their hands. The Board sent a telegram to say that the Presidents were going out, and that the demands of the men would receive favourable consideration. The very word gave satisfaction, and set the authorities at once on the side of the Company. Now to show what agitation was—and he saw no reason why he should not put this in the possession of the proprietors—when the representatives of the men and the Labour Chamber met the Syndic (who is the head of the Municipality of Milan), the Prefect of the district, and the Company's Manager (M. Solanges), an agreement was come to almost immediately; and it was anticipated that the men would return to work almost at once. This certainly was the anticipation of all at the meeting. But the men went from there to the assembly of the workmen, and the workmen received the announcement favourably, for they were only too desirous of returning to work. Then the advocate to whom he had referred went to the meeting, and stirred up strife again by delivering a long and bitter speech, and once more the men refused to work. However these difficulties were overcome; and the men at all the stations of the Union des Gaz had returned contentedly to work. Now, thank Heaven, they heard nothing of the man of whom he had spoken. Their men were doing their work again, and the normal supply of gas to the cities had been restored. Mr. Lucas and M. Salanson were still there on this business, and also in the hope of bringing to a final settlement matters that were open between the town and the Company—matters that were of great moment to the shareholders. He was not going at present to state the nature of these; but he could tell them plainly and clearly that they had nothing to fear from them. The result must be to their benefit, and not to their detriment. They had claims against the city of Milan; and they would be reasonable in those claims. He (the Chairman) felt perfectly certain that the highest Court—the Court of Cassation—would recognize the justice of the demands the Company were making. They would not extort the uttermost farthing; and whatever the result—as no credit had hitherto been taken for them in the accounts—it must be to the shareholders' advantage. Therefore, he asked for a special vote of thanks to Mr. Lucas and M. Salanson, for the services they were rendering, and for their devotion to the interests of the Company.

Mr. Garey seconded the motion, which was unanimously carried.

The Chairman, having stated that the substance of the resolution should be cabled to Mr. Lucas and M. Salanson, moved a vote of thanks to the Secretary, Managers, Engineers, and staff of the Company and of the Union des Gaz, with special mention of the services recently rendered by the Managers at Milan, Genoa, and Alessandria. Regarding the Secretary, he said that it was due to him that the accounts were so favourable as they were, and that they had such a large supply of contracted coal outstanding. He spoke of the devoted services of the Managers generally; but with reference to those at the three cities named, he said that no thanks could compensate them for the exertions they had made on behalf of the Company. The Directors would take care that they were substantially rewarded for the risk, trouble, and anxiety they had undergone.

Mr. R. Hesketh Jones seconded the motion, which was also unanimously passed.

Mr. H. D. Ellis proposed a vote of thanks to the Chairman and Directors. He remarked upon the exceptionally trying time through which the Board had been passing; and then, speaking of the transfer of £5000 to the reserve fund, said, so far as his individual opinion went, he entirely approved of that. He had had some little experience of gas companies; and he thought it was a most prudent thing to strengthen the Company by fortifying the reserve.

Mr. Cave Orme seconded the motion, which was also cordially agreed to.

A brief response by the Chairman concluded the proceedings.

The gross and net rateable value of the Metropolitan boroughs are £45,255,917 and £38,238,811 respectively; the City of London figuring for £5,890,020 and £4,888,378 in these totals.

PROPOSED AMALGAMATION OF THE BOURNEMOUTH AND POOLE GAS COMPANIES.

Meetings of Shareholders.

An Extraordinary General Meeting of the Bournemouth Gas and Water Company was held last Friday week, at the Offices, No. 90, Cannon Street, E.C.—Mr. C. G. WHITELEY presiding—for the purpose of considering a resolution approving of the amalgamation of the Company with the Poole Gas and Coke Company, Limited.

The SECRETARY (Mr. William Cash) having read the notice convening the meeting,

The CHAIRMAN said the Directors had called the shareholders together to lay before them the proposals they were about to make to incorporate the Poole Gas Company with their own undertaking. This was a matter which the Board had had before them for a long while; but they had waited for the proper time to arrive. It was because they at present thought this time had arrived, that they had been negotiating for the past two or three months with the Poole Company, in order to bring the matter into effect. After two conferences, the Boards had come to an agreement as to the manner in which the amalgamation should take place; and it was to this agreement that the shareholders were now asked to give their assent. The Directors felt that it would be useless to make such a proposal without they prepared and provided a scheme which would receive the hearty support, not only of the shareholders in the two Companies, but also of the consumers and ratepayers of the boroughs. It was because they believed this agreement provided a scheme which might honestly and fairly be advantageous to all of them, that the Directors confidently put the scheme before the shareholders, and asked them to give their approval to it. He thought the confidence which had hitherto been reposed in the Board was not likely to be withdrawn that day on account of the scheme submitted. Whatever they might have done for Poole and the consumers of both boroughs, the Board had certainly not neglected the interests of the shareholders of the Bournemouth Company. Bournemouth, as they were aware, had shown great development; and this increase had been going on for many years. At every Board meeting they had applications for fresh mains to be laid and for further work in their different departments; and they were bound, although they had been careful to make proper provision for meeting these demands, as prudent people and representing the interests of the shareholders, to look a little to the future. They saw that there would come a time when the Company's works at Bournemouth would be barely sufficient for what they would have to do. They had therefore had to look towards the neighbouring borough of Poole, where there were gas-works capable of great extension immediately adjoining Poole Harbour, which afforded immense facilities for getting in coal, and would also enable them to obtain their coal considerably cheaper than they could possibly do at Bournemouth. Thus they had been looking, not merely at the development that might take place at Bournemouth, but at the difficulties that might probably arise in future, not from the gas-works coming to the town, but from the town going to the gas-works. At one time, their works were almost in the country; but as the place was developing, new houses were being built up, and their works were getting to be more in a residential neighbourhood. Consequently, although they were all right at present, and in the immediate future they might have capacity sufficient to meet the demand, there could be no doubt that in the future, not long hence, they would have to look for other sources and other places, if they were to completely and adequately supply gas—and this remark also applied to water—in the very large district that had been placed in their hands. He pointed out that the Company were not seeking "fresh fields and pastures new" in their present proposals; but as they had successfully supplied Bournemouth in the past, they were trying to promulgate such a scheme as would enable them to do the same in the future. Shortly, he might say it was proposed to give such shares to the Poole shareholders as would provide them with the dividends which they were now receiving; and they had been receiving the maximum dividends for a considerable time. The Poole Gas Company had been successful; and the Directors of the Bournemouth Company believed it would be for their mutual benefit that the undertakings should be united in one. It would furnish them with the facilities which they required, and give the Poole Company additional strength by coming under what he, with humility, might call their somewhat stronger position. By introducing into Poole some of the improvements and modern methods which they had introduced with such signal success into Bournemouth, they hoped Poole would benefit. They were going to Parliament; for the scheme could not be carried out without a Bill. The Company had been fortunate in times past in getting their Bills fairly successfully through this somewhat difficult ordeal. Well, it did so happen that, contiguous to the districts at present allotted to the Bournemouth Gas Company and the Poole Company, there was an area worth looking after, which required to be supplied with gas, and a portion of which was at present supplied by the Poole Gas Company. They therefore wished to include in their Bill the somewhat larger area between the two districts, in order to supply it with gas. From a shareholders' point of view, this was an area likely to be of immense use in the future. This was rapidly developing; and, without unduly raising their hopes, he might say it was likely to be an extremely valuable district. If they agreed to the proposals of the Board, it would enable the Directors to proceed with the Bill, which would include powers to take in this intermediate area, and thereby strengthen, as he was convinced, the present position of the Company.

The SOLICITOR (Mr. Morriss) then explained the agreement, which stated that the consideration to be paid was as follows: For every complete £70 of "A" stock in the Poole Company, which carried 10 per cent. dividend, there would be alloted £100 worth of "B" shares in the Bournemouth Company, which carried 7 per cent.; for every £175 of "B" shares of the Poole Company, which only carried 4 per cent., there would be allotted ten "B" shares in the Bournemouth Company carrying 7 per cent.; for every fifteen "C" preference shares of the Poole Company, ten preference shares of the Bournemouth Company, carrying 6 per cent., would be allotted; and for every ten "C" ordinary shares in the Poole Company, ten "B" shares of the Bournemouth Company would be allotted. There was a clause providing that every shareholder of the Poole Company should get his proportional fractional part; and the Bournemouth Company were to pay the expenses of the winding up of the Poole Company—these being limited to £100. The Bournemouth Company were to pay the Directors of the Poole Company, by way of compensation for loss of office, £750; and they also agreed to take over the staff and servants of the Poole Company on the conditions upon which they were now serving. They would further deal with certain prominent officials of the Poole Company. With regard to Mr. Davis, the Secretary and Manager, he would continue his services for a certain term at a salary of £300 per annum; and Mr. W. H. Gutch was also to be retained at a salary of £100 a year. As to the completion of the purchase, if the Bill before Parliament received the Royal Assent before Sept. 30, 1902, the purchase would be completed on that date; but if the Royal Assent were not received in time for this, the purchase was to be completed at the expiration of one calendar month from the date of such assent.

The CHAIRMAN then formally moved a resolution approving of the amalgamation, sanctioning the agreement, and authorizing the Board to carry the scheme into effect.

Mr. CORBET WOODALL seconded the resolution. He said the Directors' opinion was that the amalgamation would result in the advantage to the shareholders of the two Companies, as well as to the consumers. The Poole Company had carried on their business very successfully in the past. One of the best criterions of this was the fact that they had paid their maximum dividends for a great number of years. But, at the same time, the working results were not so good as those of the Bournemouth Company. If they put the undertaking of the Poole Gas Company into equally good condition with that of the Bournemouth Company, they would effect a great saving. The Poole Company, although their working results were not so good as those of the Bournemouth Company, had been able, by means of their situation, to buy coal more cheaply; and upon this there was a very fair margin. Another point was that the business of the Bournemouth Company was increasing to such a large extent, and the town itself was growing so rapidly, that it was desirable the Company should have power to extend their works; and it was considered that if within their area they could include Poole, they would be able to erect additional works when necessary, and have conveniences for the more economical conduct of their business. He fully believed the amalgamating of the Companies would result in decided economy.

Mr. A. W. OKE said when they remembered that all the members of the Bournemouth Board were expert in gas matters, the shareholders could leave the subject of amalgamation with confidence in their hands. The agreement looked as if it would not only be of great advantage to the two Companies, but also to the consumers; and as Poole did not appear to have been developed to the extent it might be, there would be an almost immediate source of income from that quarter.

The resolution was then carried unanimously.

A similar resolution was passed at a meeting of the shareholders of the Poole Gas Company, which was held at Poole on the following day, under the presidency of Alderman H. FARMER, J.P.

In Poole generally the proposed amalgamation is looked upon with a great deal of favour, as it is hoped the result will be to lower the price of gas in the town, and also increase the illuminating power.

Further Extension of Incandescent Gas Lighting in the City.—Last Thursday, the Court of Common Council resolved, on a report of the Streets Committee, to further extend the incandescent gas system for the public lighting of the City; the parts selected being Old Jewry, Walbrook, the refuges at the western end of Cheapside, Fenchurch Buildings, and the Prince Consort statue on Holborn Viaduct.

The Management of the Coventry Gas-Works.—Notice having been given to Mr. G. Winstanley to terminate his engagement as Manager of the Coventry Gas-Works, the Corporation at a recent meeting confirmed a resolution of the Gas Committee to appoint a Sub-Committee to consider and report what duties and powers should in future be attached to the office of Manager, what his remuneration should be, and upon what terms, and subject to what conditions, the appointment should be made.

Shortage of Gas at Brighouse.—Early last week, an accident occurred to one of the furnaces connected with the installation of inclined retorts at the Brighouse Gas-Works; and as the darkened condition of the atmosphere caused an unusual demand for gas, the Gas Committee deemed it advisable to restrict the supply. They therefore informed the millowners and other large consumers that they would be unable to furnish gas for lighting the mills and works in the borough on Thursday night and Friday morning and evening, but that the full supply would be available on Monday. This step was necessitated by a desire not to interrupt the domestic and public lighting services. On Wednesday, preparations were made for bringing into use the works at Rastrick, which have been closed for some months; and in this way it was hoped to overcome the difficulty which had arisen.

Northampton Gas Company's Assessment Case.—At the meeting of the Northampton Board of Guardians last Tuesday, the Assessment Committee recommended that 10 per cent. reduction be allowed on the Gas Company's assessment in the other parishes of the town except All Saints, the assessment of which was settled in the recent appeal case at the Quarter Sessions (*ante*, pp. 398, 1041). They also presented bills to be paid by the Guardians amounting to £749 10s. 7d. This included the costs incurred by the appellants which the Recorder ordered the Guardians to pay. The Chairman, in commenting on the report, pointed out that the reduction made by the Recorder in the case of All Saints' parish was 13 per cent.; but in that parish there were all the works of the Company. They considered that a reduction of 13 per cent. off the assessment of the mains would be too much; but in order to avoid any further litigation on the matter, they agreed to take off 10 per cent.

DEVONPORT GAS ARBITRATION.

Monday, Dec. 9.

(*Before Mr.* JAMES MANSERGH, M.Inst.C.E., *Umpire.*)

This Arbitration, to determine the purchase price to be paid by the Devonport Corporation to the Devonport Gas Company for their undertaking, was commenced to-day, at the Surveyors' Institute. Mr. CORBET WOODALL, M.Inst.C.E., was Arbitrator for the Company; Mr. THOMAS NEWBIGGING, M.Inst.C.E., for the Corporation.

Mr. BALFOUR BROWNE, K.C., Mr. CLAUDE BAGGALLAY, K.C., and Mr. L. WILLIAMS appeared for the Company; Mr. FREEMAN, K.C., Mr. HONORATUS LLOYD, and Mr. F. BODILLY represented the Corporation.

Mr. BALFOUR BROWNE, in opening the case for the Company, said that last year both the Corporation and the Company promoted Bills in Parliament; and, in the result, the Company's Bill was rejected, and that of the Corporation for the compulsory purchase of the Company's undertaking was passed into law. It was not carried without strenuous opposition; but ultimately a clause was introduced, by agreement, which the Arbitrators would have under consideration. There were certain matters in which, according to the decision of the Recorder of Devonport, the Company had, in perfect good faith, acted, as he thought, illegally; and had it not been for the fact that an Act of Parliament had been passed to make these past operations legal, there would have been a difficulty in providing for certain sums. The point was dealt with by a section introduced into the Act which made the case a very ordinary one. The figures were large, because the income was large; but he believed the Corporation would get an undertaking which would be much more valuable to them than to the Company, because, besides the amount which the Company could divide among the shareholders, they had a large reserve which they could not divide. He asked, moreover, for 10 per cent. for compulsory purchase, as under the Lands Clauses Act. Then the Act provided that the maximum dividend which the Company were authorized to pay should be deemed to be the dividend which the Company paid their shareholders in the year ending May 31 last, "provided always that neither the Company nor the shareholders shall be entitled to any compensation in respect of deficiency of dividend in previous years." There was thus a give and take in the matter. The Company had divided too large dividends; and the Corporation agreed that they should be deemed legal dividends, while the Company agreed not to claim for any deficiency in previous years. It was quite true that the dividends which were to be deemed the maximum dividends only referred to a small portion of the capital—viz., certain guaranteed shares—but it did clear up that difficulty. Sub-section 4 said: "The existing reserve fund of the Company shall remain the property of the Company; but the Company shall bear and pay throughout the whole of the costs, charges, and expenses incurred by them, or on their behalf, in connection with, or incidental to, the petition presented to the Quarter Sessions of the Borough of Devonport, and in connection with the Bill." Therefore the Arbitrators had nothing to do with the reserve fund. Sub-section 7 introduced a considerable difficulty, unless they could manage to set off something against it, because, in addition to the purchase of the maximum statutory dividend, there was to be included, apparently, in the award an amount in respect of all debts and liabilities incurred by the Company. But by section 7, it appeared to be nearly as broad as it was long: "All debts and liabilities other than the said mortgage debt at the time of the transfer, and due from, or payable by, the Company, shall be paid by the Corporation; and the Company shall indemnify the Corporation against the same, provided that the Company shall be entitled to receive the maximum authorized dividends on the capital of the Company from the date on which dividends shall last have been paid up to the transfer." Apparently under sub-section 7 and section 7, the Corporation were to pay the Company the amount of all debts and liabilities *bonâ fide* incurred, and the Company were to pay them. If, on the other hand, the Corporation chose to take over all the debts and liabilities and pay them, then, of course, the Corporation would give the Company nothing. He was told that the debts and liabilities *bonâ fide* incurred amounted to about £24,000. No doubt the Company would have to prove that the debts were so incurred; but he thought there would be no difficulty in that.

Mr. FREEMAN: Are you clear, from sub-section 7, that it is to be in the award?

Mr. BALFOUR BROWNE said it looked like it; but he did not care how he got it.

Mr. CORBET WOODALL: We shall have to be satisfied as to the manner in which it is to be carried out.

Mr. BALFOUR BROWNE thought they might with perfect confidence leave the matter as to the debts and liabilities to the Accountants on both sides—Mr. Cash and Mr. Drew—to find out what they were before the award was made. Unless it could be shown that some debts were not *bonâ fide* incurred, there would be no difficulty about the matter. The only works which had been carried out since April 25 last, for which the consent of the Council was not obtained according to the Act, were an extension of mains; and this was necessary for the proper conduct of the undertaking. It was not needful to ask permission for that; but consent was applied for, and refused. He thought it was improper for the Company to ask, and more improper for the Corporation to withhold, this consent. There were two sets of accounts, unfortunately, and many little minor differences, which would have to be explained. The capital was very small, and the works had cost a great deal more. It had been made a complaint that the Company had spent large sums on capital account out of revenue. If they were paying their maximum dividends, it was not legitimate; but this was not in question now, because the dividend was stereotyped by the Act, and they had nothing to do with the past. The money put in the works out of revenue was in the concern, and did not bear dividend. If they had done the legal thing and gone to Parliament, and had capital authorized instead, it would all have borne dividend; and it would have been so much the worse for the purchasing authority now.

Mr. NEWBIGGING: It has been taken from the consumers.

Mr. BALFOUR BROWNE: But it is in the works, and bears no dividend. May I point out that the consumers have had it back already, because the Company are able to supply gas at 2s. 6d. per 1000 cubic feet, which they would not have been able to do without the money.

Mr. NEWBIGGING: You are taking credit for supplying gas at that price; but it is not all to the credit of the Company.

Mr. BALFOUR BROWNE (continuing) said the Company had paid the maximum dividends, both on the ordinary and guaranteed shares, from 1874 to 1901. Mr. Newbigging had pointed out that they had taken large sums from the consumers beyond the 10 and 6 per cent. paid. This showed how very safe the 10 and 6 per cent. were, because the Company had large sums beyond, which they could not divide.

Mr. FREEMAN: I notice the guaranteed shares are put at 6 per cent. That is slightly inaccurate, as they are only guaranteed 4 per cent.

Mr. BALFOUR BROWNE said that was so; but 6 per cent. was the dividend actually paid. As to the cost of coal, no one would pretend that this would be maintained at the rate of the past year.

Mr. FREEMAN: No; I should not suggest that.

Mr. BALFOUR BROWNE then put in various tables referring to the accounts of the Company, and proceeded to deal with the question of how the undertaking was to be valued. The amount of profit for the year ending May 31 last, was £2514 8s. 5d. Mr. Cash, the Accountant for the Company, put the repair and maintenance of works, mains, and meters at 4·71d. As this would not be enough, they had to add 0·29d. to bring it up to 5d., which would be £277 9s. 3d. This, deducted from the £2514 8s. 5d, left as the profit £2236 19s. 2d. The price of coal was 19·48d. per 1000 cubic feet; and there an adjustment had to be made. The cost of coal reached the abnormal figure of 11s. 1d. per ton over 1899. During the present year, it had fallen 8s. per ton. The net cost of coal increase in 1901 over 1900 was 9·61d. per 1000 cubic feet, from which had to be deducted 5·09d. for gas-rental per 1000 cubic feet, which left 4·52d. to be added to the revenue. This, multiplied by the 229,626,000 cubic feet sold, made £4324 12s. 5d. to be added to the revenue account.

Mr. FREEMAN: That is a wrong figure, and has been altered. It should be 227,133,000 cubic feet.

Mr. BALFOUR BROWNE said there was an alteration needed; but it only made a difference of £47. Adding the £4324 12s. 5d. to the £2236 19s 2d., the adjusted profit was £6561 11s. 7d. Deducting interest on mortgages, deposit, and temporary loans (£1243 18s. 10d.), the maintainable profit available for dividend was £5317 12s. 9d. The Company had £20,000 original capital at 10 per cent., which equalled £2000; 10 per cent. on the £15,000 additional capital gave £1500; and 6 per cent. paid on the guaranteed capital of £15,000 equalled £900. The total was £4400, and left a surplus of £917 12s. 9d.

The UMPIRE: There is no sliding-scale?

Mr. BALFOUR BROWNE: No. There was, he added, therefore a tremendous margin of charging power available, although, of course, in these days the Company would not think of charging 6s. per 1000 cubic feet, as they might do, because it would reduce the consumption. Still it was a great security. The Company asked for 30 77 years' purchase of £4400, amounting to £135,388, and 10 per cent. for compulsory purchase, making £148,926 16s.

Mr. *William Cash* produced statistics and accounts of the Company extending over the past three years. After some discussion, it was agreed that Mr. Cash should confer with Mr. Drew, of Messrs. Lass, Wood, and Drew, who had prepared accounts on the other side, as to whether differences could not be reconciled, and a joint account produced the next day.

In cross-examination by Mr. FREEMAN, witness stated that the manner in which the accounts of the Company had been kept made it difficult for an accountant to perform his duties satisfactorily. That was responsible, he believed, for most of the differences between the accounts. On May 31 last, the Company's account was overdrawn at the bank.

Mr. FREEMAN suggested that the Company had three accounts, and that the net overdraft was £25,995 5s. 9d.; but witness said he could not at the moment verify those figures. He made the net profit for 1900 £2662 6s. 7d., and for 1901 £1257 1s. 5d. The Company had no cash balance.

Mr. FREEMAN: Then the money to pay dividends was simply borrowed from the bank?

Witness: I suppose you may say so, as the overdraft now is £25,000 or £27,000. It is a thing done every day by companies.

Mr. *William A. M'Intosh Valon*, examined by Mr. BAGGALLAY, said he knew Devonport and its neighbourhood, and had made special visits in connection with the inquiry, and for valuation purposes.

Mr. BAGGALLAY: With regard to the amount expended as shown by the Company's books, you have taken the £84,109 11s. 2d. supplied by Mr. Cash as being the amount of capital shown by the books as having been expended?

Witness: Yes.

The capital of the Company raised, share and loan, amounts to £67,800?—Yes; giving an excess of capital expended, as shown in the books, of £16,309 11s. 4d. over and above the share capital.

Have you worked out the figure to show what that capital expenditure represents per million cubic feet of gas made?—Yes; £349.

What is the average expenditure on works of this description per million cubic feet?—About £650. The average of the Board of Trade is £800 odd; but that takes into account unused works. From experience and knowledge, I should say a Company of this kind would be very fairly capitalized at £650.

These works would therefore justify a very much larger capital expenditure, having regard to the gas made?—Yes; on that basis the expenditure might have been £156,650.

Therefore, you have a margin of somewhere about £300, which might properly be expended on these works before you get to the average expenditure?—Yes.

It is obvious that the dividend which is paid by the Company is correspondingly low?—Yes. Continuing, witness said that the charge for dividend upon the works was very low, having regard to the amount of work none. In fact, it worked out to only about 4½d. per 1000 cubic feet. The charge for dividend in 1901 would be 4·59d.

The Suburban Gas Companies average 8·64d., do they not?—Yes; and of the Provincial Companies, Bath is 7·20d., and Brighton 9·10d. The average of the whole of the Provincial Companies is 6·70d.

In fact, there are only one or two Companies—Rochester and Plymouth—which are below this Company?—Yes; and at both these towns the circumstances surrounding the works are not comparable in any other way.

Witness then presented his structural valuation, as follows:—

Works	£63,339	0	0
Land	8,290	14	6
Mains	22,814	0	0
Meters	7,214	0	0
Automatic installations	3,619	0	0
Services	5,513	0	0
Public lamps	2,382	0	0
	£113,171	14	6

This amount, he said, was very much more than was shown by the Company's books to have been spent on works. It was £25,443 3s. 3d. more, excluding the automatic installations. The valuation showed there must have been very considerable expenditure from time to time out of income for capital purposes. The overspent capital amounted to £18,697 17s. 1d.

Witness then produced his valuation of the Company's undertaking, based on the revised accounts for the year to May 31 last, as follows:—

Profit for year			£2,514	8 5
Repairs and maintenance of works, mains, and meters (cost per 1000 cubic feet sold)	4·71d.			
Amount allowed	5·00d.			
Leaving to be deducted from profit	0·29d.,			
which, multiplied by 229,626,000 cubic feet sold, equals			277	9 3
			£2,236	19 2
Net increase in the cost of coal in 1901 over 1900	£9,194	12 1		
Deduct increased revenue due to such increase	4,869	19 8		
			4,324	12 5
Maintainable profit			£6,561	11 7
Deduct interest on mortgages £518; on deposits, £72 18s. od.; and on temporary loans, £653 0s. 10d.			1,243	18 10
Maintainable profit available for dividend			£5,317	12 9
Maximum dividends as paid for year:				
10 per cent. on £20,000 original capital			£2,000	0 0
10 ,, ,, ,, £15,000 additional ,,			1,500	0 0
6 ,, ,, ,, £15,000 guaranteed ,,			900	0 0
			£4,400	0 0
Amount of surplus maintainable profit			917	12 9
30·77 years' purchase of £4400			£135,388	0 0
Add 10 per cent. for compulsory purchase			13,538	16 0
			£148,926	16 0

To that figure had to be added the amount of the Company's liabilities at the transfer day, in accordance with sub-section 7 of clause 5 of the Council's Act, which also provided that the Company should be entitled to receive the maximum authorized dividends on the capital of the Company from the date on which dividends should last have been paid up to the transfer day. The difference in the price of coal had only been taken as between 1900 and 1901; but if reference were made to the preceding year—1899—when the price of coal was normal, it would mean a further saving of 2s. 1½d. per ton of coal carbonized, equalling 2·73d. per 1000 cubic feet of gas sold. This, multiplied by the quantity of gas sold in the account year, would equal a further £2612 19s. 11d., which, if added, would increase the maintainable profit to £7930 12s. 8d., and leave a balance of maintainable profit, after paying dividends, of £3530 12s. 8d. In arriving at the figure of 30·77 years as the proper multiple to be applied to the dividends of the Company, he called attention to the following facts, as showing the exceptional position of the Company as regards the security they offered for the continued maintenance of the dividend. First, the low capital expenditure, which amounted, in round figures, to about £350 per million cubic feet made, as against the usual expenditure of £650. Second, the low price at which gas was sold per 1000 cubic feet; the maximum price authorized by their Act being 6s., and their selling price 2s. 6d. and 2s. 4d. Third, having consideration to the existence of the land area, the gasholders, offices, and other buildings, that provided a total sum amply sufficient to erect a complete modern works with a capacity of twice their present production; or, in other words, it was sufficient, if the purchasing authority thought it so desirable, to completely sweep away the existing works, and erect an entirely new modern works of the same capacity as at present, without unduly adding to the capital account. Further, the reduction in the annual expenditure, consequent on modern works, would increase the balance of revenue sufficiently to pay the interest of the capital required for their erection. It was, therefore, clear that the security offered by the Devonport Gas Company was altogether exceptional; and, as far as the Company were concerned, it would place existing income beyond the shadow of a doubt. In explanation of the figure for the net cost of coal, witness pointed out that, in the account year, the cost of coal reached the abnormal figure of 11s. 1d. per ton over 1899, necessitating a temporary increase of 6d. per 1000 cubic feet in the price of gas. During the present year, the cost of coal had already been reduced 8s. per ton below the price paid in the account year; and the price of gas had also been reduced to its former rate. Therefore he had restored to the available net revenue the net amount of extra expenditure for coal in 1901 over 1900. The net increase in the cost of coal in 1901 over 1900, per ton carbonized, was 7s. 5½d., which was equal to 9·61d. per 1000 cubic feet sold. This, on the quantity sold of 229,626,000 cubic feet, equalled £9194 12s. 1d. From this he deducted the increased revenue received by the Company due to the rise in price—viz., 5·09d. per 1000 cubic feet sold—which equalled £4869 19s. 8d.; leaving the balance of £4324 12s. 5d.

Cross-examined by Mr. FREEMAN: Do you consider the Company are in a good position?

Witness: In an excellent position.

With excellent works and well-secured income?—Their works are old-fashioned. There has been no attempt to modernize them; but the Company have a large margin in every way, both of capital, works, and payment of dividend.

Do you know as a matter of fact that for years past the Company have entirely failed to satisfy their customers?—I do not know that.

Do you know that one of the principal reasons why the Corporation promoted their Bill was because the supply of gas was bad in quality and quantity?—I have no doubt the Corporation would say that.

Were you present in Parliament during the proceedings?—No; but I read them.

Do you know a large amount of evidence was given that the streets were not properly lighted, and also the private houses?—I do not remember that; but I would answer the question by saying that the worse the management in the past, the more opportunity it gives the purchasing authority in the future.

So that the worse the Company has been managed, the more you ought to pay for it?—Yes; certainly, as a purchasing authority.

If you get a company which is worked very badly, you ought to put it on the highest possible table?—You must take the surrounding circumstances. In this case, you have not an inflated capital, but a capital which has never been spent.

You have been taking this money out of the pockets of the consumers?—The justification, it appears to me, is that the price of gas is as low as any other company of the kind in the neighbourhood or anywhere else.

Has not that result also been got at not merely by taking the money, but also by starving the works?—No; I do not admit that at all. The works are old-fashioned, it is true; and my notion would be entirely different as to continuing them in the state they are in. But that is not to say they are starved.

In the returns made by the Company to the Board of Trade, the annual expenditure on maintenance of works and mains is given?—I suppose it is.

In 1891, it was 2·25d.?—That is too low.

In 1892, it was 1·98d.; in 1893, 2·48d.; in 1894, 3·40d.; in 1895, 3·27d.; in 1896, 3·42d.; in 1897, 3·18d.; in 1898, 5·63d.; and in 1899, 4·06d.?—You have answered it by taking the last two years. The accounts were not at first properly allocated. When they were handled by the accountants in 1898, they found that the proper amounts had been put to repairs and maintenance, and the figure goes up. That 3d., or whatever it was, would be found in carbonizing, or in some other department. The information given by the people in charge was more accurate in 1898 and in 1899, and therefore it got put under the proper head; whereas in the previous years it did not.

As regards the site, do you say this is a convenient one for the works?—I think so.

You know they had not enough money to pay their dividend?—Yes. I do not think that matters at all.

The only way they did pay their dividend was by borrowing money from the bank?—In the same way that everybody does.

Do you suggest that they did pay back their overdraft, or has it not been steadily accumulating?—Yes; it has.

I dare say you know that ever since May 31 last the overdraft has increased by several thousand pounds?—No; I do not. But I should not at all wonder.

The Act under which the Company was constituted was the Act of 1853?—Yes.

And since that time they have never come to Parliament?—No.

The way they avoided coming under the control of Parliament was by paying out of revenue for a good deal of capital work?—Yes.

With the result that it has been practically taken from the consumers?—No doubt. You could not get it both ways. The consumer has had the advantage of having it invested in the works, with the result that the gas is cheaper to-day than if new capital had been raised.

You are aware the Company have one very large consumer, taking about 25 per cent. of the entire trade—the Government?—Yes.

Do you consider that is at all an element of danger to the Company?—To a certain extent I do.

Nevertheless, you have put the Company in as good a position as you could possibly do?—I have. I do not know its equal anywhere in England; otherwise I should not have put it at 30·77 years' purchase.

No amount is allowed for putting the works in order?—No; it would have been absolutely wrong to do it. Modernized works would be a great deal more remunerative.

You dealt with Morley, I think?—Yes. If Morley is worth 25 years' purchase, this is worth 45 years'.

Mr. *Joseph Cash* was next called, and examined by Mr. L. WILLIAMS. He said he had visited Devonport, and agreed entirely with what the last witness had said as to the condition of the works.

Mr. WILLIAMS: With a slight expenditure, could they turn out considerably more than they do at present?

Witness: Undoubtedly—50 per cent. more. Continuing, he said that the district was a growing one, and the undertaking was certainly worth 30·77 years' purchase.

Tuesday, Dec. 10.

Mr. *Cash*, recalled, said that Messrs. Lass, Wood, and Drew claimed to deduct from the profits of Messrs. Cash, Stone, and Co., and the latter claimed to add to the profits of the former, the following items: Coal £111, residuals (coke) £26, purifying £92, meter renewals £70, fittings depreciation £145, and bad debts £80—making a total difference of £524. This statement was merely put in as a matter of record.

Since the previous day, the Acccuntants had met, and had agreed to the following figures :—

	Cash, Stone, and Co.	Lass, Wood, and Drew.
Net profit, as per tables	£2514	£1395
Charge for repairs of works and mains .	3991	4914
Total profit on gas, subject to a charge per 1000 cubic feet in respect of repairs and maintenance of works and mains	£1505	£6309
Half difference.	98	98
Profit as agreed	£6407	£6407

Subject to correction for repairs and maintenance of works and mains on 227,130,650 cubic feet of gas sold.

Mr. *Valon*, recalled, said that, in consequence of the above agreed figure, he had reduced his amount of surplus maintainable profit for the year from £917 12s. 9d. to £782.

Mr. *Robert Porter*, in answer to Mr. BAGGALLAY, said that during the last five years the consumption of gas had been rapidly increasing in Devonport—having risen 33 per cent. As to a Government Department taking 25 per cent. of the gas, he did not regard that as a source of danger, but rather the contrary, as it required less outlay to distribute the gas. It was used chiefly for heating and power purposes. Looking to the facts of the case, he regarded the prosperity of the undertaking as well assured. The site was a good one, and was 4¾ acres in extent ; and the whole of the works generally were much in excess of present requirements. The maximum daily make was 1,022,000 cubic feet. The average daily make for a week in December, 1900, was 959,972 cubic feet. Witness proceeded to describe the detailed alterations which might with advantage be made in the present works. He also dealt with the question of the coal ; stating that he anticipated the price would go back to that of 1900, but not below it. His structural valuation amounted to £135,494. He agreed with Mr. Valon as to the 30·77 years' purchase and 10 per cent. His value of the undertaking therefore amounted to £148,926.

Mr. LLOYD (in cross examination) : Do you begin to feel the rise in coal first, or the rise in coke ?

Witness : The rise in coal.

The three years before me show that the substantial rise in coke was between 1899 and 1900, and the bulk of the rise in coal was between 1900 and 1901 ?—No ; I do not think so.

You took credit for the increase which these tables show, and you enlarged upon the fact that the rate of increase showed 7·70 per cent. in the last five years ?—Yes.

You have not realized the amended table which has been put in, which reduces that to 5·79 per cent. Your evidence has been given without noticing what corrections had been made ?—I did not know that. I will make that correction.

Is that material ?—Yes.

We will see how you apply it. I suppose a decrease of 25 per cent. of the consumption would be a serious thing ?—I could not entertain it for a moment. It is not practicable. We do not meet with it in everyday practice.

Would it be a serious thing ?—Of course it would ; and I will tell you why.

I do not care why. You know the Admiralty and War Office, and one or two others, take about 25 per cent. of the consumption ?—About 22 or 23 per cent. is nearer.

There is the War Department, the Admiralty, and Sir John Jackson. When finished, all these works will be in the hands of the Government ; and then it will be 25 per cent. If that were lost, it would mean 25 per cent. of the present consumption being lost to the Company ?—Yes.

That is too horrible to contemplate ?—It is not practicable.

You have said that this gas is chiefly supplied to the Admiralty for heating purposes ?—Heating and power.

I suggest to you it is practically for neither, but for lighting ?—I obtained information when I was at Devonport that the consumption in this particular case was largely in the day-time, and for the purposes which I have named.

Largely in the day-time ; but I suggest that for heating it is limited to about seven stoves, and for power to two gas-engines of 10-horse power, and that all the rest is lighting. Do you still persist in your answer ?—Yes ; from the facts which have been given to me.

Who gave you the facts ?—The Secretary of the Company.

I take it you know nothing of it from your own knowledge ?—No ; I do not.

Assume it to be practically all for illuminating, and that the Government contemplate setting up electric lighting works of their own, is it still impracticable to suppose the loss of that 25 per cent. ?—Yes.

Why ?—Because it is our experience that they would never take the whole of the consumption away ; and from what you have said, there would still be the quantity the gas-engines and the stoves were using left.

Have you considered what proportion that would be ?—It would reduce the 25 per cent. considerably.

If the facts be as I have stated, would you call this a stable concern ?—Yes.

Would it affect the concern at all ?—Temporarily ; and it would prevent the outlay of capital which is now contemplated.

Would you still put the same number of years' purchase upon the undertaking ?—I would, most decidedly.

Which do you consider the more stable undertaking—that which supplies small consumers, or that which supplies large ones for trade purposes ?—The one supplying small consumers.

And it was in order to call the Arbitrators' attention to this fact, that you said the average per meter was 35,700 cubic feet ?—Yes.

You still say that there being one consumer of about a fourth of your whole supply does not alter the stability of your undertaking ?—Not in this particular case.

And your number of years' purchase remains the same ?—That is so.

Turning to another point, I suggest to you that the retorts in the old house are in a very bad state ?—When I saw them they were in good condition ; and the heats were excellent.

In the new retort-house the settings cannot be worked to full advantage ?—That is absurd.

The make of gas per mouthpiece there ranges from 5000 to 5500 cubic feet ?—It is over 6000 cubic feet in that house now. I know the plant is capable of producing 7500 cubic feet, under proper conditions.

Do you know whether this is a compulscry purchase or not ?—I know what I have been told—that it is.

If the Directors reported to their shareholders that the purchase was by agreement, would it affect your opinion ?—Not at all.

Re-examined by Mr. BAGGALLAY, witness said it was a common practice for an agreement to be come to during the proceedings in Parliament, when it was seen how matters were turning ; but that did not affect the compulsory sale. The War Department and the Admiralty were old customers of the Company, and were supplied at a cheaper rate than other consumers.

Mr. FREEMAN, in opening the case for the Corporation, said the matter was now a great deal simpler than it had been, because the Accountants had agreed as to the figures. In Parliament, there were two Bills ; and the Corporation Bill was taken first. It early became evident that it would be desirable that terms for the basis of a settlement should be arrived at. The Company had been proceeding under the powers of their Act of 1853 ; and with that coyness which sometimes distinguished gas companies, they thought it unnecessary to intrude themselves upon the attention of Parliament for 48 years. They were thus able to carry on their business in a way which any Parliament would have modified if they had come before it. That was the whole secret of the peculiar feature in the case—that the Company had been carrying on a good deal of capital work out of revenue. It was suggested that this was largely a matter for congratulation and pride ; whereas they had been taking money out of the pockets of the consumers, because they had used their surplus which would otherwise have gone in reduction of the price of gas. Among other things, they had been paying 10 per cent. upon shares which were only entitled to 6 per cent. That was one matter which was brought to the attention of Quarter Sessions ; and application was made to the Recorder to have the matter put right. After hearing evidence, and receiving a report from the two experts who were asked by the Recorder to specially report upon the condition of the Company, he found that they had as a fact paid 10 per cent. when they were only entitled to pay 6 per cent. Therefore a question arose whether the Corporation could not require them, as a matter of fact, to repay certain amounts which they had paid in this way ; and also whether their actual dividends in future should be limited. The Corporation had a claim against the Company of £20,000, and the Company had a claim of £9000. Under these conditions, the basis was arrived at in section 5 of the Bill : " In assessing the sum paid by the Corporation to the Company, and the rates of dividend to be hereafter paid by the Company, the maximum dividends which the Company are authorized by law to pay to their shareholders shall be deemed to be the dividends which the Company paid to their shareholders in the year ending May 31, 1900, provided always that neither the Company nor the shareholders shall be entitled to any compensation in respect of deficiency of dividends in former years." The effect of this was to balance the two contentions, and wipe them out. It meant that the Company should be entitled to pay the £4400 in dividends if they could do so ; but it did not mean that the Arbitrators were to take that as a stereotyped figure which they could pay for all time. That would be a matter of evidence ; and the Corporation would prove that it was by no means a well-secured income. Mr. Freeman then proceeded to contend that the amount of the *bonâ fide* debts and liabilities was one which would arise at a subsequent stage, and should not be included in the award of the Arbitrators.

Mr BALFOUR BROWNE proposed that Mr. Drew and Mr. Cash should decide the figures. He would certainly ask the Arbitrators to put it into their award.

Mr. FREEMAN took a preliminary objection to their jurisdiction in that matter.

Mr. BALFOUR BROWNE said if that were the attitude of the Corporation, he would have to call further evidence to prove that the whole of the debts were *bonâ fide* debts of the Company. The point must be decided. Sub section 7 said : " The sum to be paid by the Corporation to the Company as the price or consideration for the purchase, shall be included in the amount awarded in respect of dividends, and a further sum equal to the amount of debts and liabilities." The next sub-section ran : " The Corporation shall pay the purchase money "—that included that sum—" to the Company on such day as may be agreed, or, failing agreement, on the 30th June or 31st December next after the date of the award determining the amount of the purchase money." Therefore the award must determine the debts and liabilities as part of the purchase money.

After a short deliberation,

The UMPIRE said : We have agreed that this question should be included in our award.

A question then arose as to the evidence with regard to the liabilities up to date.

Mr. BALFOUR BROWNE said he was not prepared with evidence at the moment, but would bring it forward at the next meeting. He suggested that the two Accountants should meet and arrange what figures they could, and determine upon which of the points there was a dispute.

The UMPIRE : I think that would be a good plan.

Mr. FREEMAN : I do not wish to stand in the way. Suppose we agree to meet you in this way—the transfer should be as from Dec. 31 ?

Mr. BALFOUR BROWNE : I want the money first.

Mr. FREEMAN : Yes ; I agree.

Mr. BALFOUR BROWNE : If it carries interest I do not mind.

Mr. FREEMAN : Very well. Continuing his argument, the learned Counsel asked what was the position of the Company, and contended that it was not carrying on business in a satisfactory way. There were constant complaints as to badness of light, and also as to the malodour of the gas. Frequently the streets and houses were left in darkness. The Company also were not in a position to pay their dividends. The

way they kept their works showed they had not spent enough upon them. The result was that, so far from there being any surplusage, they were not only old but ill-designed, and were either worn out or utterly inadequate to supply the gas which they ought to do. Therefore there would have to be a considerable deduction made from what was found to be due to the Company, in order to put the plant in a satisfactory condition to carry on the work. In 1901, he would show that the Company would not have had anything like enough money to pay their dividends without assistance from outside. For this purpose, he took the figure of £6407. In regard to the deduction for repair and maintenance of works and mains, it was admitted that, for works in good condition, 5d. was not an unreasonable amount. In the present case, he submitted 5·5d. was the proper figure for works and mains, which gave a deduction of £5202; leaving £1205 as the actual sum. Then arose the question as to coal. He admitted that some substantial rectification ought to be made. The net cost in 1900, according to Messrs. Cash's account, was 9·87d.; but they had not taken into consideration the question of coke upon the other side. The rise in the price of coke came into effect before the rise in the price of coal; the substantial part being the rise in coke between the years 1899 and 1900—5·51d. to 8·32d.—whereas during the next year it only rose from 8·32d. to 9·03d. In coal, it was exactly the reverse. The rise in 1899-1900 was from 16·41d. to 20·60d.; but in 1900-1, it sprang up from 20·60d. to 30·79d. Therefore, he contended that there should be an increase of 1d. per 1000 cubic feet, making it 10·87d. Then it followed that the net cost of coal for 1901 would have to be increased by 1d. per 1000 cubic feet, making it 18·70d. The difference between these two was 7·83d., which, as the multiplier of the actual figure (227,036,000 cubic feet), gave £7407. Then, deducting the increased revenue by the increased price of gas, £5184, the net figure for rectification of the coal account was £2223, which, added to the £1205, gave the actual gross amount of £3428. Deducting the interest on mortgages, deposits, and loans, £1244, there remained a figure available for payment of dividend of £2184. He did not assert that sometimes the Company might not be able to pay their £4400 dividend; but, according to his evidence, they could not have done so if the price had remained at 2s. 6d. If the figures he had given were at all correct, they showed that it was not an absolutely assured dividend. So far from there being a surplus in the account year, there was a very substantial deficit, after making all rectifications. His witnesses said it was impossible to put the security of the Company at more than 25 years' purchase; and £4400 multiplied by 25 gave £110,000. This assumed that the works were in first-rate order; but his evidence would show that they were not, and that at least £20,000 would have to be spent upon them. The witnesses for the Company admitted £10,000 was necessary, although, of course, they denied that it should be a charge upon the Company. Deducting this £20,000, it reduced the value of the undertaking, according to the Corporation, to £90,000. As to the 10 per cent. for compulsory purchase, it was not compulsory; but an agreement had been arrived at during the proceedings before Parliament—an agreement in which considerable concessions were made by the Corporation to the Company.

Mr. *A. L. Pilling*, Town Clerk of Devonport, examined by Mr. BODILLY, complained as to the quality and quantity of the gas, and stated he had received, in his official capacity, several public complaints on the subject. He had written to the Company, but had not received a satisfactory reply. The Company were not subject to any statutory liability as to illuminating power. Under these circumstances, the Corporation determined to take the undertaking into their own hands. Witness proceeded to read the correspondence which had taken place between the Company and the Corporation with regard to the complaints. As to the Government works, he understood that a considerable amount of electric light was used in the dockyard.

In cross-examination by Mr. BALFOUR BROWNE, witness said the Corporation were about to provide an electric light installation, and did not anticipate that this would interfere with the consumption of gas. He could not say whether the poor quality of the gas was due to the badness of the works or of the management. He had had complaints from the beginning of his term of office (in 1897), both with regard to the street-lamps and the new streets in which the full supply was not available.

(To be continued.)

DEVONPORT GAS-WORKS TRANSFER.

The Corporation and the Company's Employees—The Arbitration.

At the Monthly Meeting of the Devonport Town Council on Thursday last—the MAYOR (Mr. E. M. Leest) presiding—the Gas Committee recommended that the Secretary, clerical, and collecting staff in the employ of the Gas Company be "given the option of coming over to the Corporation with the works, so that the Committee may have a full opportunity of arriving at a mature judgment before deciding that the services of any particular member or members of the staff would not be required." The Committee also proposed that the members of the staff be temporarily retained on the terms of their present employment by the Company. The Borough Treasurer and Gas Manager were requested to report as to the best method of collecting the gas accounts after the transfer of the works. The Committee further stated that they had informed the Finance Committee that the gas undertaking would probably be transferred to the Corporation at the end of the present year, and had requested the Committee to make the necessary financial arrangements. A proposal to construct a tramway to connect the quay with the electric tramways running past the gas-works, so as to provide for the carriage of coal from the ship's side to the works by electric traction, had been under consideration.

The adoption of the report having been moved,

Mr. D. D. SHEPHERD proposed, as an amendment, to omit the word "temporarily" from the minute relating to the employment of the gas-works staff. He was of opinion that the staff should be taken over by the Corporation with the undertaking. It was only fair and legitimate that a public authority should not disturb any arrangements that might exist between the business absorbed and the employees. He would like them all to be taken over, as if directly engaged by the Corporation. If they did not give satisfaction, steps could be taken to get rid of them; but every effort should be made to protect the vested interests of the staff and workpeople.

Mr. R. H. RENDLE seconded the amendment, and endorsed the opinion of the mover that the Corporation should retain the services of those connected with the Company—especially the collectors.

Mr. G. RISDON said it was the intention of the Committee to do all they possibly could to retain the services of the employees; but their hands ought not to be tied.

Alderman H. W. BRYANT endorsed the view that the servants of the Company should be retained. He said that those who had been in the employ of the Company for many years should be given to understand that their situations would be kept for them.

Several other members having expressed the opinion that the Committee should be given a free hand in the matter,

Mr. J. C. TOZER said he thought they ought not to enter into a business of this kind with any sentiment except one of consideration for the ratepayers. The Committee had no desire to get rid of any of the employees; but when once men were employed by the Corporation, there was great difficulty in getting rid of them. When they took over the charge of the undertaking, it would be as a source of profit to the ratepayers. By their resolution, the Committee were safeguarding the interests of the employees. It was their duty to retain those who would be useful; and if possible they would keep all. But he hoped they would not bind the Committee. He was sure that no one would be injured who ought not to be.

Mr. P. C. GOODMAN remarked that he would treat the matter as if he had bought the works himself. There might be men there who had spent their best days in the service of the Company. Still, when they bought the works, they did not buy the people. He could not fancy their guaranteeing, before the transaction was completed, that everyone there—the maimed, the blind, and the obsolete—should be taken over. If they did, they might have, in the course of a few months, some poor old soul, quite unfitted for work, coming to the Corporation for a pension, on the strength of his many years' service. Were they prepared to take over such liabilities? The principle involved in the amendment seemed to him wholly vicious.

The TOWN CLERK said that allusion to the question of the employment of the staff had been made in the course of the arbitration proceedings. In a sense, the Corporation and the Gas Manager were attacked because the Corporation had come to an arrangement to retain the services of the Manager; and he (the Town Clerk) stated that the attitude of the Gas Committee was that they did not see any reason why, because the Corporation were taking over the gas works, the staff should be disbanded. The present disposition of the Committee was to take over the Manager, Secretary, and the whole of the collecting and clerical staff; and, acting on the instruction of the Committee, he had written to the Secretary telling him what was suggested. This official had gladly fallen in with it, and had expressed his greatest appreciation of the courteous consideration of the Committee, and stated that he believed every member of the collecting and clerical staff would entertain a similar feeling of thankful obligation to the Committee for the hand held out to them. But while there was this disposition on the part of the Committee, it would be a great pity if the Council said that the staff should be taken over without any investigation of the individual merits or capacity to perform a fair amount of work for the salary paid them. As far as he knew, it was a good staff; but the Committee should be given discretionary power in the matter.

The amendment was negatived, and the Committee's recommendation adopted by a large majority.

Mr. H. BANBURY then moved, and Mr. SHEPHERD seconded, that the recommendation that the Gas Manager and the Borough Treasurer should report on the subject of the collection of the gas accounts be referred back to the Committee, with a view to the appointment of a Sub-Committee to deal with the matter.

On a vote being taken, 19 voted for and 19 against the amendment, which was carried by the casting vote of the Mayor.

Considerable discussion took place with reference to the appointment of four members of the Council to attend the arbitration proceedings in London.

Mr. GOODMAN said that in Committee none of the four would give way; and although three was considered a sufficient number, it was decided, for the sake of peace, that all four should go. He objected to this as useless expenditure. The cost of the deputation for five days was £41 6s. 8d.

Mr. W. HORNBROOK defended the appointment, and said that the question for discussion was whether £86,000 or £149,000 was a fair and proper price for the undertaking. The Gas Company considered it so important that they sent eight representatives to London; and the Gas Committee were not guilty of extraordinary discretion in sending half that number.

Mr. M. FREDMAN was of opinion that the presence of four or six representatives would make no difference to the Arbitrators or their decision.

Alderman S. D. BROOMING thought that, as none of the gentlemen were called as witnesses, one in addition to the Town Clerk would have been sufficient.

The MAYOR said that if it had not been for the presence of the deputation, the proceedings would have been adjourned. The Directors of the Company tried their hardest to get this done.

It was decided that in future no deputation from the Gas Committee shall exceed three, unless ordered by the Council.

Price of American Gas Coal.—With regard to the various reports which have appeared in the Press during the past few months that American gas coal was underselling Durham gas coal in the Mediterranean and other markets, the "Newcastle Chronicle" states that a contract has just been obtained by a Durham colliery for about 24,000 tons of gas coal over the next few months, at 16s. 9d. per ton c.i.f. Savona, including tax. The price quoted for the American coal was 22s. per ton, or 5s. 3d. more than the Durham coal.

THE GAS-STOVE QUESTION AT MORECAMBE.

An Explanation.

In the "JOURNAL" for the 22nd of October, we reported the principal points in a heated discussion which took place in the Morecambe District Council, at their monthly meeting in the preceding week, on the subject of certain allegations made at a previous meeting against the Chairman of the Gas Committee (Mr. R. B. Abbott). On that occasion, one of the members (Mr. J. R. Birkett) was reported to have raised a question which implied that Mr. Abbott had been paid a commission on orders received by the Richmond Gas Stove and Meter Company for stoves supplied to the Council, and further to have made use of words to the effect that "a great many" of the Company's cookers and meters would have to be thrown on to the scrap-heap within a very short time. In view of the seriousness of these allegations, the Company addressed a letter to the Clerk of the Council, asking for a public withdrawal of them. A communication was also addressed to Mr. Birkett thereon. As the nature of his reply seemed to indicate that he had hardly realized the gravity of the Company's complaint, their Solicitors (Messrs. Greenall and Co.) wrote to him on the 14th ult. to again call his attention to them, and to the effect they had had upon the business of the Company. They put it to him that it was neither fair nor manly to use such words as those imputed to him, and leave them to injure the Company, without explanation or withdrawal. They concluded by asking whether they were to understand from him that he denied having made use of the words reported, or had no intention of reflecting upon their clients' mode of conducting their business or on the articles manufactured by them. To this letter Mr. Birkett replied, on the 19th ult., that the two statements alluded to were not correct. He explained that his contention at the August meeting of the Council was not against slot meters and cookers, either from the Richmond Gas Stove and Meter Company or any other firm, but against a further purchase by the Council "until the first had been fairly and squarely tried, considering the large amount recently paid for the gas undertaking." Mr. Birkett said he had "no feeling whatever" against the Company. It is satisfactory to find that the worthy councillor had been misreported.

SOWERBY BRIDGE GAS ACCOUNTS.

The Auditor's Report.

Readers of the "JOURNAL" may remember that at the audit of the accounts of the Sowerby Bridge District Council a few weeks ago, by Mr. M. D. Propert, the District Auditor, on behalf of the Local Government Board, objection was taken to the cost of the public lighting being made a charge upon the gas-works revenue (*ante*, p. 1326). On the same occasion, it was alleged that, in disposing of the surplus coke at the gas-works, undue preference was given to a contractor (Mr. L. Atkinson), who sold the coke to persons residing within the Sowerby Bridge district, contrary to the terms of his contract. The Auditor has since forwarded his report to the Council; and the following are his remarks on the above subjects and other matters of interest.

It cannot be argued that expenses incurred in the lighting of your district are a charge upon the funds of your gas undertaking; and I accordingly transferred the sum of £866 11s. 5d., the cost thereof, to the debit of the district fund account, to which it is properly chargeable. I also transferred from the gas-works accounts the expenditure, amounting to £156 11s. 5d., in connection with the obtaining of an Electric Lighting Order, which must be charged in accordance with the provisions of section 7 of the Electric Lighting Act of 1882; and I credited the district fund account with £75 0s. 1d., which I found to be the surplus on the gas revenue account, after making the transfers above referred to, pursuant to the provisions of 24 & 25 Vict., cap. 80, as amended by the Council's Provisional Order of 1894, article 6. It is important that the expenditure of your Council should be charged to the proper funds, and it should always be borne in mind that the question is one of law, and not of convenience or expediency.

With regard to the disposal of surplus coke, it appeared to me that, though your Council did not seem to have followed the most business-like course in the arrangement made with Mr. Atkinson, there was not sufficient evidence to justify me in making upon the members of your Council a surcharge, which I was asked to make, of the difference between the price paid by Mr. Atkinson and that which might fairly be expected to have been obtained. I suggest that tenders should always be procured or invited from contractors, as the publicity thus given to the matter would tend to preclude the possibility of suggesting favouritism and resulting loss. Your Chairman, who, with other members of your Council, was present at the audit, and heard the allegations made, promised that this matter should be carefully investigated and considered; and in making this investigation, regard should be had to the prices prevailing at Halifax during the currency of Mr. Atkinson's contract, which, I was informed by the Chairman of your Gas Committee, regulated the prices at Sowerby Bridge. Your Surveyor has undertaken that, in future, details shall be shown in all cases of additions and omissions in connection with contracts.

Though loth to interfere with a subscription to so excellent an institution as the Halifax Infirmary, it may be necessary that I shall have to deal with a similar payment in the future, as it appears to me to be very doubtful whether the contribution can be regarded as coming within the terms of section 131 of the Public Health Act, 1875. I also took exception to the payment of your Gas Manager and Baths Manager of interest at the rate of 3½ per cent. per annum on £100 and £20, respectively, which they had deposited with your Council as security. Security is not furnished by your Treasurer, Collector, or Cemetery Registrar, as required by section 194 of the Public Health Act, 1875, the requirements of which should be strictly complied with.

The first batch of letters of allotment in the South Staffordshire Mond Gas (Power and Heating) Company have been posted.

SERIOUS EXPLOSIONS IN GAS-WORKS.

In the last issue of the "JOURNAL," it was our painful duty to record the sudden removal by death, on the previous Saturday, of Mr. William Carr, the Gas Engineer to the Stalybridge Corporation; and in another part of the present number will be found a reference to the funeral ceremony, which took place last Tuesday. By a remarkable, and at the same time sad, coincidence, the works which had so recently been under Mr. Carr's supervision were the scene of a disastrous explosion. It occurred about eleven o'clock in the morning, and its effect was to completely destroy two purifiers, seriously damage two more, and blow off the slated roof of the shed containing them. The report was heard all over the town, and caused considerable alarm. In the works, however, the centre of the trouble, there was a surprisingly small amount of disorganization. An official, describing the occurrence, is reported to have stated that there was "one big burst," and then they set to work to put things to rights. Almost simultaneously with the explosion, flames broke out on the site of the wrecked purifiers, which were charged with oxide of iron; and the extinction of the fire was the first necessity. Under the direction of Mr. W. Hill, the Deputy-Manager, the gas was promptly turned off; and the Fire Brigade quickly quenched the burning woodwork. The next thing was to keep up the continuity of the manufacturing operations. This was accomplished by bringing into use two uninjured purifiers which were lying idle; so that the supply of gas to the town was not interrupted. Fortunately, no one was in the purifier-shed when the accident happened; but there were workmen on the roof of the adjacent retort-house, and two of them were injured by the wreckage, which was blown in all directions by the explosion, the force of which was upwards. Two other men sustained slight cuts. The area of destruction was therefore limited to the shed, though the roofs of the surrounding buildings suffered damage. A large quantity of the *débris* fell upon the crown of one of the holders and stove it in; but the hole was promptly covered and the escape of gas arrested. Medical assistance arrived at the works within a few minutes of the accident, and the injured men were attended to and sent to their homes. Considering the violence of the explosion, and the fact that about 130 men were upon the works, it is a matter for congratulation that the casualties were so slight. The Chairman of the Gas Committee (Alderman Ridyard) and other members of the Corporation were quickly upon the scene, and superintended the work of clearage. Mr. Carr's son (Mr. Harry Carr) also hurried to the works. By good fortune, Mr. Isaac Carr, of Widnes, was in the town, attending his brother's funeral; and he promptly offered his services to help the Corporation out of their difficulty. He at once set to work to repair the two damaged purifiers, and made such progress that on Saturday he expected to have one in operation by yesterday, and the other at the end of this week. As stated above, two purifiers escaped injury; and, by continuous changing, these two boxes were made to do the whole of the purification. We learn that the late Mr. Carr had prepared a scheme for doing away with the whole of the six purifiers next summer (as they were small and inconvenient to work), and replacing them with plant better suited to the requirements. With the two purifiers now being repaired, and the two at present doing the work, it will be possible to tide over the winter, after which some such alterations as those which Mr. Carr had projected will be carried out. Nothing definite is known as to the cause of the explosion; but it may possibly have been due to a mistake with the valves, and the firing of the oxide in the purifier that was off. In this connection, a correspondent suggests that in the investigation which will be made into the affair by the Home Office, special attention should be directed to the exact nature of the purifying material in use at the time, as several instances have been known of explosions taking place with certain preparations of oxide. Definite information on this point is called for, in order to prevent similar disasters, which might not be unattended by loss of life or serious personal injury, as, happily, has been the case at Stalybridge.

Another remarkable coincidence in connection with this disaster was an explosion on the previous night at the Halifax Gas-Works, of which the late Mr. Carr was for some years Engineer and Manager. It appears that a workman who was attending to the water-gas plant opened a wrong valve, and admitted gas into a pipe leading from the blower to the generator, causing the latter to explode. The vessel was partially wrecked, and the building damaged. It is expected that this loss will amount to about £200. Owing, it is supposed, to the accident, the supply of gas in the low-lying parts of Halifax was so limited on Friday evening that several large firms had to send their workpeople home before the usual time. At noon an intimation was received at the railway station that the supply of gas was likely to run short, and a number of lamps were procured and lighted in the evening.

The Morecambe Gas Manager's Claim.—The arbitration upon the claim of Mr. William Duff for compensation for loss of office at the Morecambe Gas-Works, will shortly take place. Both parties have agreed to the appointment of Mr. J. Shiress Will, K.C., as Arbitrator. Mr. Duff, who retires from the management of the works at the end of this month, claims £5993.

New Joint-Stock Companies.—The Acme Sunlight Gas Syndicate has been registered with a capital of £15,000, in £1 shares, to acquire any patents, licences, concessions, &c., relating to any invention connected with the production, treatment, storage, application, distribution, and use of acetylene gas, and to carry on the business of gas makers and suppliers, gas and mechanical engineers, &c. Under the title of Moffat's, Limited, a Company has been formed, with a capital of £2000, in £1 shares, to acquire the patent and patent rights, wholly or partially, of an invention known as the Lucas Incandescent Intensive Gas-Lamp, and "all such rights, privileges, and advantages as G. D. Moffat has with the Allgemeine Beleuchtungs und Heiz Industrie Actiengesellschaft, of Berlin," to acquire the sole agency for Great Britain and the British Colonies, or elsewhere, for the sale of the lamp; and to carry on the business of manufacturers, manufacturers' agents, &c.

ELECTRIC LIGHTING NOTES.

The Local Government Board having granted the Whitehaven Rural District Council a loan of £10,000 for electric lighting purposes, the Council asked for an extension of the time (ten years) fixed for its repayment. The Board, however, have declined to alter their terms. The period for which the loan was sanctioned was limited to ten years, on the ground that some portions of the former loans were still outstanding.

According to a statement made by the Chairman of the Electric Lighting Committee of the Sleaford Urban District Council at the last meeting of the Council, the electric lights in the town are now "going better," and things appear to be progressing more satisfactorily. There is an increase in the quantity of current used, and applications have been received for 83 additional incandescent and two arc lamps; making a total of 446. The Local Government Board have sanctioned the borrowing of a further sum of £1000 for the purposes of the undertaking. The Committee have decided not to set aside any money for depreciation.

At a further meeting of the Bath City Council, sitting as the Electric Lighting Committee, last Tuesday, Mr. Manville, of Messrs. Kincaird, Waller, and Manville, was appointed to report to the Council on the present condition of the works and the future of the undertaking. An important letter was read from the Engineer (Mr. Teague) placing on record his views. He urged the necessity of prompt action, if there was to be any improvement in the next winter's lighting, and said the Council must not lose sight of the importance of securing the supplying of power to the Tramway Company, which would undoubtedly effect a reduction in the present cost of generating the lighting current.

At the meeting of the Beverley Town Council last week, there was a long discussion with regard to the proposed electric lighting scheme. Application has already been made to the Local Government Board for leave to borrow £15,000 to carry out the works; and the Board of Trade have indicated the system to be adopted under the Order. Mr. Copeland moved that the scheme described by the Board of Trade be carried out. Mr. Hird (who till a few months ago was the Borough Surveyor) discussed the estimates of the Engineers at some length. He said they disclosed a great amount of bungling; and he maintained that the scheme was totally unsuited for a town of the size of Beverley. There would be a direct loss on the working of £1000 a year, to say nothing of a loss, which he estimated at double that amount, which would be occasioned to the gas-works – the Corporation's own property. Mr. Copeland ridiculed the idea of Mr. Hird pitting his opinion against that of the experts who had made the estimates. Eventually, when a vote was taken, there was a tie; and the Mayor gave his casting vote in favour of the scheme.

Further correspondence has taken place in the columns of the "Newcastle Daily Journal" on the subject of the Walker electric light scheme, to which reference has already been made in our columns. The letter by "Trader," noticed last week (p. 1544) has called forth one by "Councillor," who considers that the communication was inspired by some grievance under which the writer was suffering to such an extent as to "somewhat limit his perception of the principle which is really involved." "Councillor" puts his case—or rather that of the body of which he is a member—as follows: "Municipal trading has been called into existence by the fact that the cost of municipal management has for some time past been steadily increasing, and the authorities have found it difficult to raise sufficient money to carry out the works in their districts. An addition to the rates is at once felt by the whole of the community, and nearly always—probably always—resented; but a trading scheme, if fairly successful, has not this disadvantage. Municipal authorities exist, and must carry on their work. For this purpose money is necessary; and any scheme by which it can be raised should receive the cordial support of the ratepayers, whose pockets it will save."

Owing to a serious breakdown, Cardiff was deprived of its electric light supply for a short time on Monday evening of last week. The trouble was due to a fuse "blowing" in a high-tension box in the transformer sub-station at the junction of Castle Street and High Street. This caused a short-circuit, and threw a heavy load on the machinery. There are several sets of machines in the power station which run in sequence. The first one to receive the effect of this abnormal load, although the newest machine in the place, would not bear the weight; and several armature coils going, the dynamo was badly burnt. The load was then transferred to the other machines, with the result that their fuses blew, and total darkness ensued. This, however, does not seem to be the only unfortunate circumstance in connection with these works, for, according to a statement made by "Electrical Investments," and reprinted by the "Western Mail," the "adverse balances shown year by year in the accounts form a melancholy procession of financial failures." They do indeed; the total deficiency for the six years during which the works have been in operation being no less than £9342. In the year ending March 31 last, however, there was a surplus of £9 16s. 5d.; but with regard to this notable achievement, "Electrical Investments" says: "The last accounts rendered show a nominal balance of £9 16s. 5d., which is absolutely fictitious, as no provision has been made for depreciation." It seems that electricity is still the rich man's light.

In August last, the East Molesey District Council passed a resolution authorizing the Clerk to apply for a Provisional Order to enable them to have a supply of electric light in the town. Since then, however, the advantages of incandescent gas lighting appear to have been more highly appreciated by the inhabitants than they were before; and, accordingly, at the last meeting of the Council, Mr. Masters moved to rescind the resolution. He said the Council had already expended something in connection with the Order, and he called it money thrown away. He thought they had better put this down as a loss, rather than go further into the mire. They could not make a profit in disposing of the Order if they obtained one; and at Kingston, where electric light had been tried, it had proved a failure. All the large ratepayers were in favour of incandescent gas, and not electric light. Mr. Ridgway seconded, and Mr. Alderton supported the motion. Mr. Ray said it was never intended that the Council should instal the electric light themselves, but that they should lease the Order, which could be done. Electric light was not a failure everywhere, and it was the light of the future. Mr. Lodge termed the resolution "one-eyed," stating that they were satisfied with the present system, and that there was no demand for incandescent gas lighting. Mr. Stanton asked who was going to lease the Order from them if they got one. Even Sir William Preece said that incandescent gas was cheaper than electricity. The Chairman (Mr. H. J. Robertson) expressed the hope that the Council would not stultify themselves by rescinding the resolution they had passed unanimously. He had no doubt they could lease the Order. The motion was carried with only four dissentients.

Some weeks ago (*ante*, p. 1113), the Liverpool City Council decided that it would be expedient to apply to Parliament for power to charge special rates for the supply of electricity to customers having a separate installation; and accordingly provisions have been inserted in an "Omnibus" Bill which it is proposed to promote in the coming session empowering the Corporation, notwithstanding anything contained in the Electric Lighting Acts, 1882 and 1888, to make special charges in cases where a person has a separate supply of electrical energy. At a special meeting of the Council which was held to consider the Bill, Alderman Bartlett explained that a clause similar to the one proposed had been adopted in other cities; and he said it should be introduced into the Bill so as to enable the Corporation to charge a higher rate for an occasional supply of electricity. Where a shopkeeper only came to the Corporation in a case of emergency, it seemed unfair that he should draw upon the quantity of current capable of being produced at the moment, and expect it at the same rate as the man who took a supply regularly. Alderman Watts thought the clause a most unfair one. The Committee had a monopoly of electric lighting; and he maintained that they ought to be able to supply it to any extent that would be reasonably required. It appeared to him to be a piece of impertinence for the Committee to come forward and ask that they should be allowed to charge just what they pleased if a tradesman required a little more electricity than was ordinarily provided. Mr. Wood thought it was absolutely ridiculous that a tradesman who had his own installation of electricity should be allowed to come to the Corporation at a moment's notice and demand a full supply at the rate paid by regular customers. Mr. Dart said it was simply to protect the public of Liverpool that the clause was introduced. On a vote being taken, the clause was carried by 66 votes to 16; and it therefore remains in the Bill. A ratepayers' meeting was held on Friday, and resulted in the proposal to promote the Bill being carried by an overwhelming majority. A poll was, however, demanded, and it will take place early in January.

At the meeting of the Court of Common Council of the City of London last Thursday, Alderman Smallman, on behalf of the Special Electric Lighting Committee, brought up a report in reference to recent negotiations between the Corporation and the City of London Electric Lighting Company. The Committee had been appointed to see whether certain differences between the City and the Company, consequent upon serious litigation, could not be satisfactorily adjusted. The contracts with the City for the lighting of the central and western districts had been declared null and void; while those for lighting the remainder of the City, which was 45 per cent. of the whole area, were declared valid and subsisting. From this decision both the Company and the Corporation had a right to appeal if they chose. The Committee and the Company had met in conference, and, on the understanding that all differences should be settled and all further litigation abandoned, certain heads of agreement had been suggested, without prejudice to the rights of either party. At the last moment—that morning, in fact—the Company had insisted on such vital alterations in the terms of the agreement that the Corporation had no option but to break off further negotiation; and the Committee recommended that the reference to them should be discharged. Alderman Smallman said the action of the Company constituted such a breach of faith that it was impossible to proceed further in the matter. The motion to discharge the reference was carried, and, now that the Special Committee were dissolved, questions referring to the electric lighting of the City were sent back to the Streets Committee to be dealt with. A letter received from the Charing Cross and Strand Electricity Supply Corporation, Limited, was read, stating the price at which they would be prepared to supply the electric light in the City, and adding that in the case of municipal buildings the rate would be 3½d. per Board of Trade unit. They would also be prepared to tender for the public lighting, not only of the principal, but the side streets, for the latter of which they believed no provision was at present made. They presumed that, in a matter of such importance, public competition would be invited. Alderman Smallman moved that the communication should be referred to the Streets Committee, observing that it had not been before the Special Committee, and was not a factor in their decision to break off negotiations with the other Company. The letter was referred to the Streets Committee, and also to all other Committees dealing with the electric light. On Saturday, a long explanatory letter from Mr. J. Cecil Bull, the Manager and Secretary of the City of London Electric Lighting Company, appeared in the papers. He repudiated the charge of "breach of faith" in the negotiations for a settlement of matters outstanding between the Corporation and the Company, brought against him by Alderman Smallman. He acknowledged that there might have been misunderstanding in the minds of some members of the Committee; but in this case a further conference, to remove such misunderstanding, would, he said, have appeared the more dignified course to adopt.

In an article under the head of "Nemesis at Bath" in their current issue, our contemporary "Electrical Investments" says: "We shall not be very much surprised if the ancient City of Bath gains some sort of additional historic interest as the first English town in which the usually apathetic ratepayers were goaded into action by the commercial failure of a stupid municipal trading speculation. The Council's electric light works are a white elephant of the most delicate constitution, and most insatiable appetite for rates. The unfortunate ratepayers have been taxed year after year to keep this municipal pet alive, and at last they have been stirred to rebellion. It was only in 1897 that the Corporation took over the works from the local Company, which was doing a quiet and steady business, as well-behaved companies should.

The purchase price was the moderate sum of £24,535; but the Corporation immediately spent a further amount of £56,642 on extensions. When application was made to the Local Government Board for leave to borrow, it was represented to the Inspector who presided at the inquiry that the works should bring in a revenue of £11,943, with a net profit, after allowing for depreciation, of £1561. But, alas! the tale of Bath has been loss upon loss, and the undertaking is now in a bankrupt condition. It has had to be financed by heavy overdrafts at two banks; and at a full-dress debate on the 3rd of December, Councillor Bush declared that 'unless certain measures were taken quickly, their cheques would be dishonoured by their bankers.' Mr. Dickinson, M.P., who is on the Council, thought 'the best conclusion they could arrive at was to make up their minds to end their connection with the electric light;' and, judging from the local Press, there is a feeling among the ratepayers that the undertaking should be sold as a 'going concern.' In all frankness, we see no hope of any such relief for the ratepayers. They have allowed themselves to be drawn into a business for the management of which their elected representatives are entirely unfitted. They have lost heavily; and they seem likely to lose still more heavily in the future, as it does not seem probable that any amount of municipal tinkering can make the undertaking a sound one. Money spent in that way—and a member of the Committee said they 'were bound to come to the Council almost at once for a very big sum'—is simply so much money sunk in a concern that will never produce any return, at least, under municipal direction. If it is any consolation to the citizens of Bath who formed a deputation to the Council, and whose views were admirably expressed by Mr. Austin King, we can assure them that there are many other towns in a position little, if any, better than that of Bath. The first crash has come to Bath; but that city will not be held up to isolated ignominy. The greater number of municipal electric works are financially unsound, and must expose their inherent weakness sooner or later. It is almost pathetic to turn from the account of the *débâcle* at Bath and read that at a recent meeting of the East Barnet District Council one of the members tearfully declared that 'if we part with our Provisional Order our children will curse us.' The obvious reply to this gentleman is to tell him to go to Bath."

On Tuesday last, Mr. H. H. Law, M.Inst.C E., on behalf of the Local Government Board, resumed the inquiry into the application of the Erith Urban District Council for sanction to borrow £23,506 for electric lighting purposes. The first day's proceedings were briefly noticed in our issue for the 26th ult. (p. 1397). Several witnesses were called to give evidence as to the desire on the part of themselves and the ratepayers generally to be supplied with the "new illuminant." One of them said the result of his canvass was 42 in favour, 11 against, and 44 indifferent; but cross-examination elicited the fact that he told those on whom he called "that in all probability they would get electric light at a price equal to gas at 3s. 6d. per 1000 cubic feet." Mr. W. C. Hawtayne, Consulting Electrical Engineer to the Council, said his estimate for the scheme adopted was £18,706. There would be nine arc lamps in Erith proper; and the remainder would be incandescent. They proposed to adapt the existing lamp-columns; and there was no sum included in the loan for private wiring. In cross-examination, he said there were 440 lamps for public lighting; and these, burning 3600 hours per annum, would give an output of 126,720 Board of Trade units. He had provided for a possible supply of 7000 private lamps; and he thought within a year or two these would all be taken up. If the private supply was increased beyond that, they would have to put down additional plant. The total private consumption was estimated at 112,000 units. At 5½d. per unit the undertaking would pay; but at present he adhered to 6½d., which was equivalent to gas at 3s. 3d. per 1000 cubic feet. He estimated the gross revenue at £4429, and the cost of production at £2539—leaving a gross profit of £1890. He set down £1514 for interest and sinking fund, £1055 for salaries and wages, and £686 for material used in production. There was nothing allowed for depreciation; this being taken in the gradual repayment of the loan. A sum of £383 was put down for repairs. After paying interest and sinking fund, there would be a net profit of £375, if the 7000 lamps were taken up. The evidence in favour of the application having been concluded, Mr. F. J. Stevens, Managing-Director of the West Kent Gas Company, said the charge for gas was 4s. 6d. per 1000 cubic feet; but by Christmas they would be enabled to make a reduction of 3d., and in all probability there would be a further reduction of 3d. in March next. By refusing to take gas for public lighting, he was of opinion that the Council wanted to force the Gas Company into making a general reduction. The only reason why the Company objected to the electric light scheme was owing to the burden that would be placed upon the rates. He was of opinion that the demand for electric light in the district would be very slight. The Company's property in Erith was rated at £965. They were prepared to supply the public lamps with gas at 3s. 3d. per 1000 cubic feet. Mr. H. Shoosmith, Engineer to Messrs. William Cory and Son, said his firm (who had special facilities for generating electric light cheaply, owing to their being able to use refuse coal) were prepared to furnish the Council with a current of 440 volts at 2d. per unit; and the only capital outlay necessary by the Council would be that incurred in laying down mains and providing lamps. This would mean a cost per lamp of £3 2s. a year, as against £3 9s. 6d. which was charged for the present oil-lamps. He estimated that under Mr. Hawtayne's scheme the cost per lamp per annum would be £6 11s., not counting the arc lamps. Some ratepayers having put forward their objections to the proposals of the Council, the inquiry terminated. One of the witnesses for the opposition, in the course of his evidence, said he considered that the Gas Company had taken an unfair advantage of the ratepayers in being represented at the inquiry. Be this as it may, the Company have gained one of their main objects, which was to publicly record the facts that they offered gas at 2s. 6d. per 1000 cubic feet for public lighting before the oil-lamps were installed, and that they have three times since offered the Local Authority a supply at 3s. per 1000 cubic feet for the same purpose.

The Barry Town Council have resolved to proceed with the proposed Provisional Order (*ante*, p. 1479) to secure powers to use profits on the gas-works to liquidate the loss on the water supply.

THE METROPOLITAN WATER QUESTION.

The County Council's Bill Sanctioned.

At the Meeting of the London County Council last Tuesday, the Parliamentary Committee presented the following report:—

In accordance with the instructions of the Council on 5th of November last, we have prepared and circulated a Bill for the purchase by the Council of the undertakings of the eight Metropolitan Water Companies on similar lines to that of last session. His Majesty's Government, on the 19th of November, published a notice of their intention to introduce a Bill in the next session of Parliament dealing with the question of the London Water Supply; and we have given careful consideration to the terms of this notice. Although it may be inferred from the notice that the Government Bill will embody many of the provisions contained in the Council's Bill of last session—provisions which were then objected to by the opponents of the Bill—we do not find anything to indicate that in the important matter of the constitution of the purchasing authority the Government Bill is likely to coincide with the instructions received by us from the Council. It is, moreover, premature to consider the effect of the Government measure before the Bill itself has been deposited. Under the circumstances, we are unable to suggest to the Council that it should in any way alter its policy as expressed in the resolution of the 5th of November.

It is to be hoped that the Government Bill will be deposited, like other similar Bills for the purchase of Water Companies, on or before the 17th of December; and it will in any case receive our best attention as soon as it is published. We understand, however, that it is not unlikely that the Bill may be introduced as a Public Bill, at such time after the assembling of Parliament as the Government may think fit. In a matter of such vital interest and importance to London, it would be manifestly convenient that the Council should have ample time to consider the measure in all its bearings.

The Bill we now ask the Council to approve provides for the purchase by the Council, either by agreement or on arbitration terms, of the undertakings of the Companies. In the event of no agreement being arrived at, the Bill makes provision, as did that of last year, for the appointment of an arbitrator or arbitrators, to be named by Parliament in the Bill, to determine as to the amount of the purchase-money to be paid. In accordance with the report of the Royal Commission appointed in 1897, we have so drawn the Bill as to preclude any allowance being made in respect of compulsory purchase. With regard to the management of the water supply when purchased, the Bill further follows the decisions of the Royal Commission in so far as it does not make any proposal for the severance of works and sources of supply among authorities outside London; but it provides that the Council shall appoint a Committee, which may comprise representatives of other bodies and persons not being members of the Council, and may delegate to such Committee any powers with regard to the management and administration of the supply.

We recommend—"That the London Water (Purchase) Bill be approved; that the seal of the Council be affixed to a petition for leave to bring in the Bill; and that the Bill and petition be deposited pursuant to the Standing Orders of Parliament, with such necessary alterations (if any) in the Bill as the Parliamentary Committee may consider desirable."

The recommendation was agreed to, with a protest from one member against the further waste of the ratepayers' money which it would entail.

Mr. Long Defends the Government Bill.

At the Sixteenth Annual Meeting of the Metropolitan Division of the National Union of Conservative and Constitutional Associations, held at the Hôtel Métropole last Friday evening, the report presented by the Council contained an expression of regret by them at the result of the last elections to the London County Council. They said it was to be feared that until the London electors could be roused from their apathy, there could be no hope of altering the present state of things. They pointed out that the result of the elections was largely affected by the misrepresentations of the Progressive party with reference to the London Water Companies. They went on to say that "widespread satisfaction" would be caused by the announcement of the President of the Local Government Board that it was his intention in the coming session to introduce a Bill to deal with the London Water Supply; and the Council were anxious to declare their entire concurrence with the principles on which the Bill was to be framed. The report having been adopted, other business was transacted, and the proceedings closed.

Subsequently, Mr. J. Bailey, M.P., gave a smoking "At Home" to meet Mr. Long; and about 1200 gentlemen were present. The President was most cordially received; and, in the course of his address, he referred to the London Water Question. He said it had fallen to his lot to have to deal with this question; and it would be his fortune—good or evil, as time would show—to ask Parliament to face it in the coming session. There could be no doubt that its satisfactory settlement would be of great advantage to London as a whole. He had thought over the subject for a very long time, and he hoped that the proposals which he had to submit would be more successful than those which had been made in the past. [A Voice: Don't be afraid.] He begged to say that he was not in the least afraid. On the contrary, he augured very good results from the reception which his proposals had met, so far as they were known; and he gathered that the knowledge upon them was not very accurate. He found it very difficult to deal with the criticisms advanced on one side by the Radical party, and on the other by those who represented the Water Companies. The Radicals had attacked his policy because, as they declared, it would result in the creation of a Trust worthy of the worst days of Tammany Hall. On the other hand, he was told by those who had spoken on behalf of the Water Companies that his Bill was a measure of confiscation and of robbery of the shareholders' property. He was not going, at that moment, to discuss which was the correct view. But from these conflicting statements, he augured well for his Bill; and between two such divergent schools he thought that, in all probability, the Government Bill had hit the happy

medium. Nothing would induce the Government to ask Parliament to accept a measure which could be correctly described as one of confiscation. While they held that those whose property was to be sold for the benefit of the general community ought to be treated with absolute fairness and justice, they also held that the ratepayers of this great city, the water consumers, who would ultimately have to bear the risks of the control of the supply of water, must also be considered and their interests regarded; and the object of the Government would be to do justice between the two. He believed their proposals, when presented, would convince Parliament that they were an honest attempt to act justly as between the vendors and the purchasers, although he did not believe either side would regard them as meeting all their requirements. Referring to the London County Council, he recognized that they had done a great deal of very admirable work. They had had stupendous difficulties to contend with; and their failure to deal satisfactorily with some of them had been due far more to the situation than to themselves. But they had made some mistakes. [A Voice: A good many.] He believed the solution of the problem of London government would be found in securing a greater interest on the part of the individual elector. How was this to be evoked? Not by concentrating all power in the larger body, but by giving to the larger body certain duties, and to the municipal corporations other duties, and by placing in the hands of bodies otherwise created, bodies representing all the interests concerned—county councils, municipal corporations, and, as in the case of water, outside authorities—the control of certain matters which they could deal with satisfactorily. If they were going to make the government of London more effective, they must distribute the duties, and give some of them to bodies which were not in themselves popularly elected.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Tuesday, at the Offices, Southwark Bridge Road, under the presidency of Alderman Sir H. E. Knight.

The Secretary (Mr. Montague Watts) read the notice convening the meeting and the minutes of the previous meeting; and the report of the Directors (*ante*, p. 1552) was presented.

The Chairman said the six months under review had been a very prosperous period for the Company. With regard to capital, it would be noticed that a new account had been opened in reference to the intercommunication works. This account had to be kept separately; but he had explained on a former occasion that the whole of the interest payable on the money raised for these works was put into one pool, and divided *pro rata* among the Companies. Consequently, although the proprietors would notice a large expenditure of capital under this head, the Southwark Company were not liable for, and did not pay, the whole of the interest, but only their quota in conjunction with the other associated Companies. At the present time, their Company had a fair surplus of capital—about £76,000—but they had a great many works in hand, and he should not be surprised if they had to raise more money before the next six months were over. The revenue account, under the head of maintenance, showed an excess of £6463 over the corresponding half year of 1900. Of this, £3419 was represented by increased rates and taxes; and £1431 was occasioned by extra wages and by the fact that the roads were now laid on concrete foundations, which meant a revisal of the contracts. Under pumping and engine charges, there was an increase of £1406, which was due to the Company having supplied the East London Water Company with between 10 and 11 million gallons of water a day. There were other items, such as law and parliamentary expenses, which went to make up the balance. On the other side of the account, it would be seen that the income for the half year amounted to £167,135, against £147,360, or an increase of £19,775. From this, however, they had to allow for £16,020 which had been received from the East London Company for the water supplied to them. It was a fortunate thing that this Company exercised the forethought in the past which had placed them in the van of water companies, and enabled them to come to the assistance of the East London Company during the half year under consideration. Deducting this £16,020 from the £19,775, they got the figure of £3755, which represented the nominal increase in their business. But as they deducted the whole amount received from the East London Company, it was only fair to allow for the extra cost incurred in pumping the water supplied to that Company; and when this was done, the normal increase came out at between £4000 and £5000 for the half year, which must be regarded as highly satisfactory. The dividend account showed an amount of £88,453, to which had to be added certain items, such as interest and the balance brought forward, giving a total of £90,350. Out of this the debenture interest was paid, and also the dividend on the preference stock, as well as their proportion of the interest on the intercommunication capital; and there was left, after paying these charges, £46,805. It was proposed out of this sum to pay a dividend at the rate of 7 per cent., when there would be left to be carried forward £10,800. The Board considered that 7 per cent. was a fairly satisfactory rate of dividend, although a good deal more had been earned in the half year, if they took into consideration the income from the supplies to the East London Company. It was not, however, thought wise to pay a larger dividend now (say, 8 per cent.) and then go back next half year to 6 per cent., which they would have to do if more were now paid. The Directors considered it far better to pay, as nearly as they could, an average dividend. With regard to the offer of £75,370 of debenture stock "B" during the past half year, he stated that the tenders sent in amounted to £179,242. This showed the satisfactory position which this Company occupied in the Money Market. The London County Council, as usual, had given notice of a Bill for purchasing the undertakings of the London Water Companies; but goodness only knew what for, unless it were for the sake of adding to the hundreds and thousands of pounds that they had already expended on this water question without result. He thought it was a monstrous shame the Companies should be continually put to the expense of opposing these Bills when Parliament had told the Council over and over again that they could not possibly be the authority for the water supply of the Metropolis. The subject of buying up the Water Companies had, however, now become urgent, in consequence of the notice which had been given by the Government to introduce a Bill for that purpose. One was tempted to inquire why the Water Companies should be bought up—why, when they were performing their duties so satisfactorily, they should be disturbed. Why should the public be put to the risk of having the supply of water in the hands of those who knew little about it, and who might lead them into great peril? There had been instances in the present year of numbers of towns in Great Britain, where the water supply was in the hands of the municipal or local authorities, which had almost suffered from a water famine. At any rate, there had been a shortage of water, which had made the people in those towns extremely anxious. In London, the Companies had had to deal with the same natural conditions; but there had been no single case of any person being deprived of half-a-pint of water. On the contrary, the supply in London was ample. Under these circumstances, did it seem wise that the present system should be exchanged for that in other towns where it had so lamentably failed? London could not be better off as regards its water supply. The Royal Commission testified to the purity of the supply; and the Companies themselves had proved their capability to furnish all that was required. The Royal Commission had further said that the price could not be less if the supply were in the hands of a central authority; and they went further still and said that it would be likely to be a little more, or have to be supplemented out of the rates. One would have thought that if the Government contemplated purchasing the Water Companies' undertakings they would at least have proceeded on the lines laid down in the report of their own Royal Commission. But what did they find in the notice of the Bill which had recently been published? Of course, this notice was not the Bill; but it might indicate what was the intention of the Government in the matter. The Royal Commission, as regarded the constitution of the proposed water authority, recommend a permanent body to be selected on account of their business capacity, and, if possible, their knowledge of matters connected with water supply. This was a sensible and reasonable conclusion. But what was to be the constitution of the water authority according to the notice of the Bill? It was to be a fluctuating representative body, ignorant of the subject, who might possibly be without any business qualifications. This was not following on the lines of the Royal Commission. Then, as to the mode of purchase, the Royal Commission recommended that the Companies should be bought up under the Lands Clauses Act, and treated in the same way as other bodies would be treated now if about to be bought up compulsorily. This was what the Commission said: "We shall assume that if the policy of purchase is adopted, the price of the undertakings will be determined by an arbitration conducted on the lines of the Lands Clauses Act." They further said: "The capacity of the Water Companies to perform their duties as water suppliers fairly well, and, in some cases, extremely well, has led to the inference by some authorities that they would be in a position to grapple with the difficulties which will confront them in the future, and this without any real knowledge as to what those difficulties will be." A higher testimonial to the Water Companies could not be written or uttered. These were the lines on which it might have been thought Government legislation would have proceeded. According to the notice, the Bill proposed that, "on a day to be named in the Act, the Board is to be at liberty to take possession of the undertaking of each Company, not only before any payment, but even before the purchase money has been ascertained." Moreover, "the Company is to be deprived in each case of all its rights and powers; and the officers and servants of the Company are to be transferred to the Water Board." Thus, before any arbitration, the Companies were to be deprived of their places of business, and their property and money, as well as their books and offices. They would have no means of protecting their interests, and no money for the purpose. Could anything more monstrous be imagined? Yet, according to the advertisement of the Bill, this was the way in which the Companies were to be treated. Then the Bill, judging by the notice, proposed the appointment of an arbitrator to determine the amount of the purchase-money for the undertaking. The determination of the arbitrator was not to be questioned by any Court; and the arbitrator was to be prevented from making any allowance in respect of compulsory sale. This was entirely unprecedented. There was no instance of any owner of property having been deprived by statute of his right to appeal to the Courts of Justice. Why should the large Water Companies, who had discharged public duties in a manner so satisfactory, be treated in such a way? There could be no doubt that the Companies would have to fight hard for their rights—probably they would have to make such a fight as they had never been called upon to make before. He hoped the Board would receive the support of the proprietors. Let them write to their Members of Parliament, and call attention to the confiscatory manner in which the Companies were proposed to be treated, and ask them to stand up in their places in Parliament on behalf of right and justice. With regard to the Company's wells at Merton and Honor Oak, these were giving very satisfactory results. The Company had no need to take a share in the intercommunication works, except that the Board deemed it in the general interests of the Companies to do so. As a matter of fact, the Southwark and Vauxhall Company were able to supply 10 million gallons of water a day beyond what they wanted for their own district. He concluded by moving the adoption of the report and accounts.

Mr. C. M. Vialls seconded the motion.

Mr. Makins asked for information with regard to one of the pumping-stations which, at a former meeting, it was said would be shut up, or disposed of, which would consequently result in a saving of £10,000 per annum. He also wished to ask if any provision had been made in the accounts for the cost of opposing the County Council Bill.

The Chairman, in reply, said that, in view of the introduction of the Government Bill, he did not imagine that the County Council Bill would pass the second reading. Last year, it did not do so, and thereby a large amount of money was saved to the Companies. However, the Bill to be introduced by the County Council would not be lost sight of, and would be opposed if necessary. With regard to the pumping-station at Vauxhall, this would later on be taken over by the

Inter-communication Works Committee. There was no Committee, but the proprietors would know what he meant. The transfer could not be carried out for the present; but when it was effected, the saving to the Company would be about the sum named.

The motion was then adopted; and the proposed half-yearly dividends were agreed to—namely, at the rate of 5 per cent. per annum on the preference stock, and 7 per cent. per annum on the ordinay stock and class "D" shares.

The retiring Directors (Mr. S. Green and Mr. Noel Whiting) were re-elected, and the retiring Auditor (Mr. S. P. Child) was also re-appointed.

At the conclusion of the ordinary meeting, an extraordinary general meeting was held, at which the Chairman proposed a resolution to the effect that the sum of £315,000, being the further estimated amount required for intercommunication works under the provisions of the Metropolis Water Act, 1899, should be raised by the creation and issue of such intercommunication stock as would produce the said sum, on such terms and conditions, and at such times and in such manner, consistent with the said Act, as the Directors might from time to time deem expedient.

Mr. VIALLS seconded the resolution, which was carried.

A vote of thanks to the Chairman and Directors, and also to the staff, having, on the motion of Colonel MITCHELL, been accorded, the proceedings terminated.

GRAND JUNCTION WATER-WORKS COMPANY.

The Half-Yearly General Assembly was held last Wednesday, at the Office, South Molton Street, W., under the presidency of Mr. FREDERICK TENDRON, F.G.S.

The SECRETARY (Mr. J. Goodwin) having read the notice of meeting, and some formal business having been disposed of, the report and accounts, which were dealt with last week, were presented.

The CHAIRMAN observed that the accounts showed clearly the comparative figures for the past half year and those of the corresponding period of 1900. In his references, he would deal with the annual figures to September 30. This year the earning power of the Company, apart from the expenditure on the Staines reservoirs for interest on the debenture stock and the capital raised for these works, had been 9·91 per cent. It must be very satisfactory to the shareholders to see that they were now so close upon the 10 per cent. which they had been looking forward to; and it was also very satisfactory to find that for the four years to September 30 last the average earnings of the Company were 9·22 per cent. He had deducted nothing for charges, except for payments on account of the Staines reservoirs. These payments had nothing whatever to do with the Company's present earnings; they had to do with a state of things which would be to the benefit of the Companies concerned, if they continued to exist, for the next thirty or forty years. They were themselves spending money at Staines to supply their district with water for at least that period; but if they were willing to be out of pocket for the moment, it was in order that they might be abundantly recouped in the future. In pursuance of this policy, the average dividend paid by them for the four years named was 7·69 per cent., instead of the average which they could have paid of 9·22 per cent. The difference between the two rates had gone in payments on account of the interest on the outlay at Staines—£23,552—and the remainder was in the balance of £29,793 carried forward. It was thus perfectly clear that the earning power of the Company in the past four years was 9·22 per cent.; and this was the contention which the Directors would make at any time if an authority were appointed to acquire the Company's undertaking. Their property must not be taken from them on the basis of the dividend, or on that of Stock Exchange quotations, but solely upon the earning powers of the Company. For this purpose, the Directors altogether set on one side the expenditure at Staines, as they were barred from asking for any profit on account of the works there. When he read the notice of the Bill which was to be brought before Parliament for appointing some body to take over the undertakings of the Water Companies, he thought he was perusing a publication of the London County Council, whose Bill, almost word for word, must have been copied by the draftsman. Speaking for the Grand Junction Company—but he was sure that the feeling was shared by all the other Companies—the Directors did not care whether such a Bill as this was brought in by the County Council or by a member of the Government, they would fight it as strenuously as possible. Having read many of Mr. Long's speeches, and having been for a lengthened period a supporter of the Government, he would not believe that any member of the Cabinet would attend to the outcry of ignorance and prejudice, and undertake to bring in a Bill embodying the demands of people to whom Cabinet Ministers, at any rate, ought not to listen. He desired to refer to a matter which, if it were not understood by the Local Government Board, would lead to the greatest mischief as regarded the Water Companies. What was called the Chamberlain's fund was only introduced as a temporary measure, when it was supposed that the Water Companies would be taken over. It had nothing to do with the ordinary sinking fund of a corporation or a government, which extinguished liabilities by payments spread over sixty or eighty years. The charge was not so unduly heavy when it was spread over such a period as that. But the principle on which the Chamberlain's fund was laid down was monstrous. Its effect on one of the partners in the Staines reservoirs scheme was this: Their share of the expenditure was, roughly, £400,000, raised at 3 per cent., which was increased to 4 per cent. by the 1 per cent. allowed by the sinking fund for management. He was not a shareholder in the New River Company, and he was not quite certain as to their rate of dividend; but it was at least 13 per cent. Their sinking fund was therefore 9 per cent on the £400,000, or £36,000 a year; so that the whole of the property would be paid for in less than ten years. The principle would operate with equal injustice to the Grand Junction Company, to the value of whose property it would make a difference of £200,000 or £300,000 if there was the remotest idea on the part of the Government of capitalizing this unjust so-called sinking fund. Turning to the balance-sheet, the Chairman stated that the Directors would have to call the shareholders together shortly to authorize their making an application to Parliament to raise some additional capital. The Company's expenditure up to the present time amounted to £1,852,801; and at the date of the acccunts the capital of various denominations raised amounted to only £1,823,180. The capital account was therefore overdrawn; but this had since been adjusted by the issue of the balance of the "D" shares, which brought in about £38,000. Before long the Directors would offer the £15,000 of unissued 4 per cent. debenture stock; but then the end of the Company's resources would have been reached, and there would be no working capital. They would therefore have to raise some money for the works which had still to be carried out, and also in order that they might have working capital. The report of the Local Government Board for the year 1900-1901 showed that, during the twenty years from 1881 to 1900, the Water Companies spent on improving and enlarging their works and ensuring a full supply of pure water—and the only supply that could be looked to in the future, *pace* Lord Rosebery—£6,119,902. Of this amount, £1,169,724 was raised in the ordinary maximum stocks of the Companies; and when the period began, the net earnings on the then amount of the maximum ordinary share capital represented 8·99 per cent., while at the end of the period the average percentage on the ordinary maximum share capital of £10,292,883 was 10·20. Therefore, in spite of all the vexation which the Water Companies had had to endure, and in spite of the misrepresentation which, to a certain extent, had brought about the alterations, they showed progress; and it was no wonder that, with figures like these before them, there was a strong desire on the part of many to possess the properties of the Companies. Let them, however, possess them by fair, and not by disreputable measures. The public were misled by the misrepresentations to which the Companies were subjected. The people of the East-end, for instance, had the idea not only that they would have an abundant supply of water, but that they would have it for nothing; while, in his speech at the recent dinner of the London County Council, Lord Rosebery showed that he had an idea that he was going to have a different supply from that which he at present received. There was, however, no other supply that could be had, certainly for years; but it was a pure and abundant supply, and far superior to what they had in the North. Some years ago, at one of the general meetings, he remarked that it was singular that the London County Council were endeavouring to make the Companies provide water for a very large increase in the population, whereas they were themselves taking no measures to increase the drainage which was to carry off the water. This matter had been brought publicly before him as a member of the Conservancy, on which he represented the Water Companies; and it was a matter of moment to shareholders of the Companies, as well as to the whole of London. The Conservancy had received complaints from the Local Government Board and other authorities respecting the disgraceful state of that part of the river which was under the control of the County Council—that the latter had not made proper preparations for dealing with the increased sewage, and that what he might describe as a sort of abomination was floating up and down the river, going up the estuaries, and half poisoning people. He believed that the County Council now intended to spend £3,000,000 to put things on a proper footing; but why was not this work undertaken at the same time that they were urging on the Water Companies to make preparations for an increased supply? He concluded by moving the adoption of the report and accounts.

The Right Hon. Viscount KNUTSFORD seconded the motion.

Mr. REMNANT, M.P., said he thought that the small attendance of shareholders must be regarded as very gratifying by the Directors; for, in view of the notice which had been published as to the Government Bill for acquiring the undertakings of the Companies, it might have been thought the shareholders would have attended in very large numbers. Their absence, however, was easily accounted for by the manner in which the Directors had dealt with the past difficulties by which they had been confronted. The Chairman had referred to Lord Rosebery's speech a few evenings since. He (the speaker) heard it, and he was not much impressed by it. Lord Rosebery had to say something, but he said as little as he could. Whether he had led those whom he was addressing to imagine that the County Council would take control of the Water Companies or not, he (the speaker) did not believe that such a thing was possible. He had carefully read the notice relating to the Government Bill, and it certainly did not tally with what Mr. Long had said; but he hoped that the Bill itself, if it intended to deal seriously with the water question, would put a very different complexion on the whole state of affairs. Unless they got fair terms, he would strenuously oppose the measure. When the London County Council first brought forward the question of acquiring the Water Companies' undertakings, they said that they could raise the capital at £2 12s. per cent. A little time ago, when they raised money, they had to pay £3 2s. per cent. for it. To get the large amount which would be necessary for purchasing the undertakings, he would be much mistaken if the County Council would not now have to pay a rate which would give the investor about £3 7s. 6d. or £3 10s. per cent. All this meant a further increase of the rates in London, and they were heavy enough at present.

Mr. G. O. BELLEWES said that, according to the notice of the Government Bill, as regarded the mode of ascertaining the amount of compensation, not only were the terms so constructed as to break down the rules which had been provided for the safety of property of all kinds, but there were specific things in the notice that must result in definite capital loss in the purchase. The Royal Commission reported that the shareholders should be compensated for the delay that might occur in finding a suitable investment, as well as for the cost of re-investment; but this provision found no re-echo in the notice. The Commission also reported that the arbitrator was to base the award on the existing net income of the Companies, and that the shareholders ought to receive such a sum as would enable them to buy an equally good security earning the same income. What the Companies were to be bought out on was, he maintained, the true actual value of their undertaking as a business concern, having regard to what they were now earning, and what they had a prospect of earning in the future.

Mr. R. A. M'LEAN said he was glad that the Chairman had called

attention to the fact—which might affect the purchase of the Company's property, if it was to be purchased—that they had never paid a dividend up to the amount of their profits, and that they had a reserve of profits. He might also point out that the balance to be carried forward after the payment of the dividend now proposed was larger than any balance that had ever been previously carried forward by the Company.

The CHAIRMAN, at the close of the discussion, remarked that the Directors were in entire accord with the observations that had been made by the gentlemen who had addressed the meeting.

The motion was then carried unanimously; and dividends were afterwards declared, for the last financial half year at the rates of 8 per cent. per annum on the £50 "A" and the £25 "B" shares, 7½ per cent. per annum on the £25 "C" shares, and 7 per cent. per annum on the £50 "D" shares, and for three months on the new £50 "D" shares sold by auction.

A vote of thanks to the Chairman and Directors brought the meeting to a close.

RATING OF THE EAST LONDON WATER COMPANY.

Valuation Appeal.

Monday, Dec. 2.

To-day, at the Westminster Palace Hotel, Mr. HORACE AVORY, K.C., resumed his inquiry (*ante*, pp. 1185, 1400, 1474) into the rateable value of such parts of the hereditament of the East London Water-Works Company as are situated in the parishes of St. John, Hackney, St. George-in the-East, All Saints, Poplar, Bromley St. Leonard's, St. Mary, Stratford-le-Bow, North Woolwich, St. Anne, Limehouse, the Hamlet of Ratcliff, St. Matthew, Bethnal Green, St. Leonard, Shoreditch, and Mile End Old Town.

Mr. BALFOUR BROWNE, K.C., Mr. C. A. CRIPPS, K.C., M.P., and Mr. DOUGLAS BARTLEY appeared for the Company; Mr. F. MARSHALL, K.C., Mr. ENGLISH HARRISON, K.C., Mr. W. C. RYDE, Mr. J. M. STONE, Mr. R. CUNNINGHAM GLEN, Mr. E. S. SINCLAIR COX, Mr. HOUGHTON, and Mr. JENKIN represented the various parishes.

Mr. MARSHALL said the question arose, which was referred to at the last sitting, as to whether evidence of the rise in the water-rentals consequent on the new quinquennial assessment ought to be admitted or not. In consequence of the new assessment, certain properties in the various parishes stood at a higher value than they were before; and the necessary result of this was that the Company, being entitled to charge 5 per cent. upon their rateable value, would get this amount more in water-rents during the next five years. What he wished to show was that the water-rents receivable by the Company in the immediate future would be, in respect of these properties, larger than they had been in the immediate past.

Mr. BARTLEY asked that the question should stand over till Mr. Balfour Browne was present.

The ARBITRATOR reserved it till after the adjournment.

Mr. *George F. Deacon*, recalled, and examined by Mr. MARSHALL, said he knew that a number of Cornish boilers had been valued by the Company at a considerably higher amount than some years ago. In his view, a boiler could not improve. It was one of those things which would always deteriorate.

The ARBITRATOR thought that was hardly disputed.

Mr. BARTLEY replied that it was simply a question of the present value.

Mr. *P. H. Green*, Managing Clerk to Messrs. Hart, accountants, of Moorgate Street, said he had taken out of the Company's books the receipts and expenditure for the account year; and he had also extracted such of the receipts and payments belonging to the previous year as were received or paid down to Aug. 17. The receipts were £55,318, and the payments £18,869. The accounts of the Company at the end of the half year showed outstanding accounts due of about £19,000, and water-rentals due of £94,000.

Mr. MARSHALL again alluded to the question of the increase of water-rentals upon existing property consequent upon the new quinquennial valuation. On consideration, he thought the Arbitrator would agree that it would not be possible to include in a provisional list an additional amount against the Company consequent upon the increase in the assessment by their incoming water-rents. In the case of *Ellis v. Camberwell*, which went very recently to the House of Lords, it was held that it was no ground for the publication that the hereditaments had, in point of fact, increased in value, but from normal causes; an increase of business or increase in value generally existing all round the parish, being no ground for the issue of such a list. A case came on last year which illustrated the point. It was with regard to the South-Eastern and Chatham Railway. It was the last year of the quinquennial period; and the Railway Company demanded the insertion of certain hereditaments in the provisional list, because they said that for certain reasons their value had gone down. On the other hand, the parishes put it to the valuer that they were entitled to show that the traffic had generally gone up, and that, therefore, there was more than a set-off against the original decrease. The valuer decided that this was inadmissible; and Quarter Sessions adopted his valuation, and therefore considered his method of valuing correct. If this were the law, the only opportunity for them to get the additional rating was at the quinquennial assessment itself. He submitted they were entitled to give evidence of what was, as far as certainty could exist, an absolute certainty that, the assessments being now made and approved at a higher figure, the water-rents would be higher than in the past, and that any hypothetical tenant would be supposed to take this into consideration and give a higher rent than he would otherwise do.

The ARBITRATOR: How do you say that the hypothetical tenant in April or June, 1900, can know that the assessments will be increased in the valuation list which comes into force in April, 1901?

Mr. MARSHALL said he thought this point was answered by what the Court had said with regard to the increase in the price of coal in some of the gas appeals. They had come on in the ordinary course later than some of the assessment appeals; and Sir Peter Edlin had said, and the present Court had said after him, that if they could ascertain that coal was going up in value, although it be by facts learned after the assessment was made, they were entitled to give that evidence. It was an advantage to the valuer or to the Court to find out all the real facts of the matter. The learned Counsel referred to the case of *Gaslight and Coke Company v. Hackney*, as supporting his argument.

Mr. BALFOUR BROWNE, in reply, said what his learned friend asked them to do was, after they stopped at the end of March, 1900, to throw themselves into the future and say that rates would, a year-and-a-half afterwards, have gone up. It was not certain that there would be a net increase of water-rental; and even if there were, the price of coal might go up, the cost of pumping might increase, and no more profit would result. In Mr. Ryde's book, the decision was stated as follows: "The overseers, in making a prospective rate, are to make it on the supposed prospective value, ascertained by them, as well as they can, from the latest evidence in their power as to antecedent value, not as to prospective value." The whole question only arose now because the sitting was being held a year-and-a-half after the matter should have been settled. At that time—March or April, 1900—there was no certainty that any of the properties would have increased in value. At the last quinquennial, the result was the other way, as, though the water-rentals were increased £4344, the increase in rates was £8656.

Mr. MARSHALL contended, further, that the Assessment Committee would know at the time that there had been an enhancement of value in the parish. As a matter of fact, the old assessment was £1,013,000, and the new £1,059,275. This meant an enhancement in value of over £46,000. The Company themselves had put in an extra expenditure amounting to over £2000, which, they said, because it was a certain expenditure and would be incurred by the hypothetical tenant, should be counted against him. In the same way, he contended that they might take the certain receipts. He submitted that, in any event, if the evidence of the increase was excluded, the evidence of the expenditure ought to be excluded, because the receipts were as certain as the expenses would be. By statute, an extra sum of £2000 a year, without the addition of a single drop of water, was to be paid by the Company to the Lea Conservancy; and, on the other hand, by statute, and without the addition of a single drop of water, the Company would be entitled to receive a very much larger amount of money. The two cases seemed to him exactly parallel.

Mr. ENGLISH HARRISON supported the argument of Mr. Marshall; and after more discussion,

The ARBITRATOR said: This is a very important question, and may go further for all I know. For what my opinion is worth, I think I am bound to limit this inquiry to facts which would be in the knowledge of the hypothetical tenant in June, 1900, the date to which the accounts have been made up, upon which the whole of the calculations have been based in this case. If any evidence is tendered on any fact that would be known to the hypothetical tenant in June, 1900, I shall accept it; but I must decline to receive evidence on facts which could not be known to a tenant until some time in the beginning of this year. I myself entertain no doubt that the evidence which is tendered would form the proper subject-matter for a supplemental or provisional list.

Mr. *F. R. Cole*, Clerk to the Assessment Committee of the Hackney Union, said the list was deposited on June 1; and the objections had to be handed in within 25 days. The list could be inspected by any of the ratepayers.

Mr. *James Skeggs*, Deputy Assistant Clerk of Poplar; Mr. *E. S. Smith*, Rate Collector of the North Ward of Bethnal Green; Mr. *W. H. Rust*, Collector of the East Ward of Bethnal Green; and Dr. *Mansfield Robinson*, Town Clerk of Shoreditch, also gave evidence on this point. Mr. Smith stated that, in his opinion, no person could have discovered what the increase would be, though he could tell there was an upward tendency.

Mr. *William Eve*, recalled and examined by Mr. MARSHALL, put in a revised valuation of the whole undertaking.

Rateable value and rates		£203,365
Add extra payment to Lea Conservancy already deducted		2,067
		£205,432
Deduct rates, 6s. 8d. in the pound, as per Mr. Marshall		51,358
		£154,074

Add for maintenance—	Total in Accounts.	Allowed by Mr. Eve.	
1.—Reservoirs, &c.	£8,428	£4,214	
2.—Mains and distributing works	19,065	16,977	
3.—Pumping-engines and charges	35,539	3,554	
4.—Filtration	5,974	597	
5.—Salaries of Engineer and staff	15,598	1,560	
6.—Salaries of Secretary, Accountants, &c.	5,302	269	
Extra maintenance	—	7,000	
			34,171
Total gross			£188,245

Witness also handed in an elaborate and carefully prepared table showing his estimate of the valuation within the various parishes, the results of which are as follows:—

	Total Rateable Value (Mr. Eve).	Amount Appealed Against.	Appellants' Valuation.
Hackney	£16,629 ..	£14,961 ..	£11,924
St. George's-in-the-East	1,610 ..	1,369 ..	785
Poplar	2,826 ..	2,242 ..	1,325
Bromley	2,831 ..	2,235 ..	1,470
Bow	3,084 ..	2,640 ..	2,008
Limehouse	1,323 ..	1,160 ..	630
Ratcliff	673 ..	529 ..	331
Bethnal Green	5,182 ..	4,465 ..	2,753
Shoreditch	2,297 ..	2,000 ..	1,452
Mile End	4,709 ..	4,150 ..	2,471

Mr. *A. L. Ryde*, examined by Mr. CUNNINGHAM GLEN, put in a table showing his valuation. The gross receipts were the same as Mr. Marshall's (£364,492); but in the expenses he had made some alterations.

He deducted 10 per cent. from the cost of engineers and clerks and directors' fees (£29,069), and had replaced the balance of repairs of mains, amounting to £5464. This made the working expenses, exclusive of rates, £101,564; but he had not included the prospective payment of £2067 to the Lea Conservancy. As to the tenant's capital, he had given £54,964 for working capital, which he found was sufficient. The meters he depreciated 25 per cent., and divided the tools and utensils between landlord and tenant. The furniture he took at £1300, and the plans at £500, which was quite as much as a tenant would pay for the plans useful to him. The total rateable value, *plus* rates, he found to be £207,155; and deducting the value of unproductive works and mains, the rateable value of the productive mains, *plus* rates, was £63,081, equal to 17·61 per cent. on £358,193—the receipts, less £6209 for builders' water. Mr. Eve's figures worked out at 17·12 per cent.

Tuesday, Dec. 3.

Mr. *W. Marshall*, recalled and examined by Mr. CRIPPS, handed in a revised valuation of the various parishes consequent on the addition of the amounts received from builders for water supplied to buildings in course of erection. The additions were very slight, and raised the old aggregate from £11,924 to £11,938. Witness had estimated the rateable value as 6½ per cent. of the water-rentals; but Mr. Eve had added 10 per cent., on account of the expenses of distribution being much less than in the country districts. On the other hand, his experience proved that the cost was higher, in spite of the greater concentration—principally from the very much heavier outlay on paving. Witness gave the actual bank balances from the Company's balance-sheets for the last ten half years; ranging from £9232 to £34,000, and averaging £18,776. The figure they asked was £12,000.

The ARBITRATOR said he noticed that, while the Company claimed a reduction on all the other assessments, they had admitted an advance of £40 in the case of North Woolwich. Was there any special reason for this?

Mr. MARSHALL said the old assessment of the parish was £145—a very low sum. This was most likely a compromise; and the Overseers of the parish had made up for their old moderation by raising the assessment to £450.

Mr. *W. B. Bryan*, recalled, said that only 2½ per cent. of the supply was delivered in the higher districts. It was pumped by water power, and the outlay was very small. Practically there was no difference in the cost of the high and low supplies. He had had the figures taken out, and had found, to his surprise, that the length of the main was the same in the inner and outside portions of their area; being 8·3 yards in each case.

In cross-examination, witness said the total length of mains in London was 851,592 yards, and in the country 924,999 yards. In London they supplied 102,000 houses, and in the country 108,000.

Mr. *Eve*, re-called, said the 10 per cent. that he had added was an arbitrary figure estimated by him. He was certain the cost of distribution should not be averaged—how much more should be charged to outside districts, it was impossible to say. The parishes concerned in this case were generally flat; and the cost of pumping less.

By the ARBITRATOR: As to the figures for the length of main, he (witness) made a mistake in a hurried calculation; and he thought Mr. Bryan had done the same. He was just as much surprised as Mr. Bryan at the result. He had every confidence in Mr. Bryan—more than he had in the person who took out the statistics for him.

Cross-examined by Mr. CRIPPS, who suggested that, to expedite the collection of the water-rates would cause friction with the customers, witness said the friction the Company had had during the last few years could not be increased. The Company wanted the money without giving the water—that was where the friction came in.

Mr. *Ryde*, recalled, agreed with Mr. Eve as to the reduced cost of distribution in the parishes, in consequence of the concentration of the supply, the dense population, and the saving in pumping.

Mr. *Pennell*, the Accountant of the Company, proved the correctness of the figures relating to the building water supply.

The evidence then closed.

Mr. MARSHALL summed up the case for the respondents, taking *seriatim* the differences between the two valuations. He challenged, first, the £2067 which the Company had claimed as the additional charge to be paid to the River Lea Conservators. If the appellants were entitled to include this prospective charge, they claimed to be equally entitled to include the prospective increase in the water rentals which would follow the new valuation. As to the tenant's capital, he contended that the amount claimed by Mr. Marshall was excessive, and that the £60,000 allowed by Mr. Eve, or the £57,000 allowed by Mr. Ryde, was an ample and sufficient amount. With this capital, the tenant might not be able to pay his rent on June 24; but by the end of July he would be in a position to pay everything, and have £14,000 in hand. It might be said that the Company should be able to pay the rent when due; but it was equally true that the Company, who had power to collect their rents in advance, should, if necessary, do so. The learned Counsel criticized the various figures in Mr. Marshall's valuation—specially alluding to the figure of £13,500 for plans, which he characterized as excessive, if not outrageous. Referring to the high estimate for the works, such as reservoirs and filter-beds, he said in many cases the Company had valued these at 50 per cent. more than the cost of construction. They seemed to have assumed that everything became more valuable on account of the advance in the price of labour and materials. He urged that the figures of the Company's witnesses were exaggerated and unreliable, and that generally the assessments by the various parishes were fair and reasonable.

Mr. ENGLISH HARRISON briefly supported Mr. Marshall's argument.

Monday, Dec. 9.

Mr. BALFOUR BROWNE to-day replied on the whole case on behalf of the appellants. In this case, he said, there were three main matters that had to be dealt with. There was, first, the amount of the tenant's share; secondly, the sinking fund; and thirdly, the value of the indirectly productive parts of the undertaking. He would not say that these were the only points that arose, because, even on the matter of receipts, there was a small discrepancy between the witnesses on one side and those on the other. Mr. W. Marshall properly and logically divided the £91 received for water supplied by another Company over five years; putting down £18 as received under that head in one year. This was the right method, because, when they came to deal with the payment by the Company to others for water—£30,829—this was spread over the five years in the same way. If, as the other side contended, the whole of the £91 ought to be in the receipts for the year, then the whole of the sum paid away for water ought to be included in expenditure. With regard to the expenditure, Mr. Marshall made this £133,154; while Mr. Eve, for the respondents, gave £128,960 as the figure—a difference of £4194. In this was included a sum of £2127, made up by Mr. Eve deducting £780 for the salaries of Engineers and clerks, £327 Directors' allowances, £538 salaries of Accountant, &c., and £482 general establishment charges. In doing this, Mr. Eve had been inconsistent. He allowed every one of these expenses when he was asked to value for the Company in 1886; but now he deducted them, because part of Mr. Bryan's time was used in defending the interests of the Company. Counsel argued that this would not do, because it had never been suggested that, had Mr. Bryan not been defending the interests of the Company, he would have received less salary. It had not been suggested that the salaries of the Engineers and others were increased by the fact that the landlord got some benefit by their efforts. As to the tenant's share, Mr. Marshall gave a figure of £34,650, Mr. Eve gave £23,100, and Mr. Ryde £22,400. All three had taken the percentage of 17½, which had been agreed upon. This agreement, Counsel understood, was intended to save a great deal of dispute which often arose as to the proper allowance to be made. But the other side had set themselves to bring down the amount to be paid upon to nothing; and had they succeeded, the tenant would have got as his capital 17½ on nothing He ventured to say that the £23,000 allowed by Mr. Eve was not reasonable remuneration. The differences were rather startling. As to cash to meet outgoings, Mr. Eve had allowed no repairing expenses on mains, because, he said, that was the landlord's concern. Counsel did not agree, because a great deal of the expense, especially of packing mains, where joints leaked, would naturally fall upon the tenant, as otherwise he would be at considerable loss in waste of pumping power and water. The Company's receipts had gone up and down. A few years ago, they were higher than to-day; and no man would take the concern for £23,100—running the risk of receipts going down, and having to meet a rental of £180,000. Not only was there the risk of falling receipts, but in the particular account year they were dealing with, the tenant would have had to pay over £30,000 for water. This might not happen again; but still, it was a risk. With regard to meters, the Company had deducted 20 per cent. for depreciation, and had also omitted to include the Deacon meters. In this, Counsel considered the Company had done wrong doubly. The Deacon meters had been looked upon as landlord's property; but they were essentially tenant's property, as they were used for discovering leakage. They were brought into use at night, when there was, presumably, no draught on the pipes, in order to see whether any water was running to waste. These meters were very expensive, and certainly should have been included in the tenant's inventory. The Company gave £62,850 as the value of meters, as against £58,922 given by the other side, who had deducted 25 per cent. for depreciation. In dealing with the item in the accounts for plans, Counsel urged that these were essential to both landlord and tenant; and as there were 1000 miles of pipes, they must of necessity be numerous. In reference to the banker's balance, Mr. Marshall had allowed £12,000, as against only £2500 allowed by Mr. Ryde; while Mr. Eve excluded it altogether, on the ground that something had been included for this head in other items. Here, again, said Mr. Balfour Browne, Mr. Eve was inconsistent; for when he valued for the Company, he allowed exactly the same figure as Mr. Marshall gave at present. Mr. Ryde gave no reason for allowing only £2500. He appeared to have done it to avoid being attacked on the question of principle. Counsel asked the Arbitrator to consider whether the various items made up sufficient to induce the tenant to take over the hereditament. On Mr. Eve's figures, the tenant would have to find £31,648 actually to be sunk, and would not get a penny of interest or profit for thirteen months. When he did obtain any profit, he got £23,000 out of a gross takings of £364,400. This worked out at 6·3 per cent of the takings. In 1886, Mr. Eve allowed £21,543 on a gross taking of £240,000, or 9 per cent. If he had allowed this percentage to-day, the sum would have been £32,790—close to the amount claimed by the Company. Then, the capital had increased between the two periods from £2,185,369 to £3,378,017—50 per cent. This 50 per cent., added to Mr. Eve's allowance in 1886 of £21,543, gave £45,000, as compared with the Company's figure of £34,000. Counsel then dealt with the question of the sinking fund. The fund allowed by Mr. Marshall to replace the hereditament was £17,922—1 per cent. on the renewable portion of the undertaking. Mr. Eve's figure was £7000. This was a percentage on the number of gallons pumped over fifteen years. With regard to the value of the indirectly productive part of the undertaking, Mr. Marshall valued it at £154,775, as against Mr. Eve's £144,110. The only difference between the parties was as to the structural value of the works. These Mr. Marshall valued at £1,575,156; while Mr. Deacon gave the figure as £1,411,990.

Mr. F. MARSHALL here interposed; remarking that this sum had been corrected to £1,419,309.

Mr. BALFOUR BROWNE accepted the correction, and, continuing, dealt with the various items in the estimates. The Company, he said, valued the intake works, reservoirs, &c., at £531,178, as against £499,578 on the other side. The difference was in the valuing of the Walthamstow reservoirs, for which Mr. Marshall allowed £400 per million gallons capacity; while Mr. Deacon allowed £375. Counsel submitted that Mr. Marshall's figure was the correct one. Mr. Deacon, he said, had not had any such London experience as had Mr. Bryan or Mr. Hunter; and he considered Mr. Deacon had put too low a value upon the works. Filter-beds were valued by Mr. Marshall at £335,523, and by Mr. Deacon at £262,872. The latter took them all round at 34s. a yard; while the former had valued them, with the

exception of Ferry Lane, at 45s. per yard. Ferry Lane was priced at 35s. per yard, because the gravel and sand were found on the ground, and ironwork was not included. Counsel maintained that, in view of the increase in the price of labour, the Company were justified in putting upon the filter-beds the price they had. Except for the Ferry Lane filter, they cost 28s. 6d. per yard in 1896, without sand; and this apparently cost 12s. 6d. They were made of brickwork, while the exception was made with concrete. Then as to pumping-stations with wells, there was only the trifling difference of £2000. This was in regard to the Chingford works, in which case Mr. Marshall had taken the price from the Company's books. Pumping-stations without wells were priced by the Company at £384,437, as compared with £350,307. The difference was principally in the case of the Prince and Princess stations, where Mr. Deacon had taken the pressure at only 109 feet, whereas in reality it was 140 feet; and he was not aware that they pumped into the reservoirs at night. There was a difference of over £4000 in the case of service reservoirs, mainly concerning those at Buckhurst Hill, Finsbury Park, and Hanwell, which were priced by Mr. Deacon at £5 10s. per 1000 gallons, as against £6. There was also a large discrepancy in regard to turbine houses, &c. Proceeding, Counsel said there was one other matter he must deal with, and that was the absurd claim made by Mr. Eve—that, in addition to the particular parishes concerned in the appeal, 10 per cent. should be added to the directly productive receipts for thickness (concentration) of supply. Counsel had never heard of such an amount being taken off elsewhere. As a matter of fact, the East London Company's undertaking spread into dozens of other parishes than those appealed against, and Mr. Bryan had said it was quite as expensive. Repairs in London and the outlying districts were practically the same.

The ARBITRATOR: Have you anything to say as to the percentage which is added to the indirectly productive mains?

Mr. BALFOUR BROWNE said he could not see how that could be applied to the indirectly productive mains any more than to the directly productive. If it was the fact that the repairs came just as expensive, then there was no ground for adding any percentage. As to the tenant's share, Counsel asked the Arbitrator, apart from the calculation of the small figures, to allow the tenant sufficient to induce him to take the hereditament, and submitted that the allowance made by the other side was not large enough. With regard to the renewals, there was the evidence from the Company as to the life of the hereditament—47 years. On that point, the parishes offered no evidence; and he urged that 1 per cent. was the proper figure to be set aside. This concluded Counsel's remarks.

The ARBITRATOR: As to the argument which took place on the evidence, I think it right to say that I intend to take into account the evidence that was given as to the returns by occupiers, if available for inspection; but I do not intend to take into account the actual figures suggested as the result of the quinquennial valuation.

Mr. BALFOUR BROWNE: On that, I said at the time that the returns will tell the tenant nothing.

The ARBITRATOR: That I will judge of.

Mr. BALFOUR BROWNE: I do not think they help the tenant to come to a conclusion at all.

Mr. MARSHALL: (to the Arbitrator) Will you make a report to the Court to that effect?

The ARBITRATOR: I think that I have said plainly exactly what I am going to do.

OLDHAM CORPORATION WATER SUPPLY.

Water for Trade Purposes.

Mr. Arthur Andrew, the Gas and Water Superintendent of the Oldham Corporation, has, at the request of the Water Committee, prepared an important report on the supply of water available for trade purposes. At a recent meeting of the Committee, Mr. Andrew stated that the Electricity Committee would shortly require a large supply of water for the working of their new generating station at Greenhill, and as the demand which they were likely to make upon the mains would seriously interfere with the supply to other consumers, he suggested that a special main should be laid from the Strinesdale upper reservoir for the conveyance of water to be used for manufacturing purposes only, and that the reservoir in question should be utilized solely for storing water from the gathering-grounds at Strinesdale and Besom Hill which now runs to waste. The area of these gathering grounds is 1010 acres; and reckoning only 15 inches rainfall annually as being available, gives a total annual quantity of 340 million gallons. In addition to the electricity station, where the consumption is likely to be some 30 million gallons yearly in the near future, rising to possibly 100 millions later, there are many other works where water which is not fit for drinking purposes can be used, such as the gasworks (Oldham and Higginshaw), 16 million gallons; the public baths, 15 millions; the electricity station in Gas Street, 10 millions; and the markets, 7 millions. No doubt arrangements could be also made with a large number of private manufacturing consumers to have this water supplied to them. Altogether, he thought it would not be a difficult matter to supply 200 million gallons a year for an outlay of not exceeding £20,000, which equalled less than 1½d. per 1000 gallons. By adopting this plan, an extra 200 million gallons yearly would be rendered available for the ordinary purposes of the town's supply. This quantity would suffice to give 25 gallons per head per day to a population of nearly 22,000 persons. By extending the special main when required later, a further quantity of water could be utilized in a similar manner. His present proposal did not provide for the special main being brought farther west than the centre of the town. It would be for the Committee to consider whether they would continue to supply free water for business departments of the Corporation, such as gas, electricity, and markets. His opinion was the water supplied should, in all cases, be paid for.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1589.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	Nov. 13	6½	Bombay, Ltd. . . .	6¼—6⅝	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¼—4⅝	..	5 9 5
380,000	Stk.	Aug. 15	12	Brentford Consolidated	265—270	..	4 8 11
270,000	,,	,,	9	Do. New . . .	192—197	..	4 11 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	130—135	..	3 14 1
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	112—115*	..	3 9 7
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	222—227	..	4 8 1
246,320	,,	,,	7	Do. A. Ord. Stk. .	150—155	−5	4 10 4
1,947,500	Stk.	Aug. 28	5	Bristol, 5 p.c. max. .	118—120	..	4 3 4
420,000	20	Sept. 27	10	British.	41—42	..	4 15 3
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
82,850	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	9½—9⅝	..	6 3 1
220,000	Stk.	June 28	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
150,000	20	July 17	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept 27	10	Cape Town & Dis., Ltd.	14½—15½	..	6 9 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	273—278	..	4 6 4
236,425	,,	,,	9	Do. New do. .	203—208	..	4 6 7
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135*	+2½	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	162—167*	−1	5 7 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165*	+1½	4 4 10
575,000	Stk.	Aug. 29	5	Crystal Palace Ord. 5 p.c.	122—127	..	3 18 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 18 2
486,090	10	July 17	10½	European, Ltd. . . .	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,079,885	Stk.	Aug. 15	4 1/16	Gas-light and Coke — 4 p.c. Ord. . .	95—97	−3	4 10 9
2,600,000	,,	,,	3½	Gas-light and Coke — 3½ p.c. max.	88—90	..	3 17 9
2,799,735	,,	,,	4	Gas-light and Coke — 4 p.c. Con. Pref.	112—115	..	3 9 7
4,063,425	,,	Dec. 13	3	Gas-light and Coke — 3 p.c. Con. Deb.	90—92*	..	3 5 3
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	208—213	..	4 13 11
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Aug. 29	10	Liverpool United A	232—234	+1	4 5 6
718,100	,,	,,	7	Do. do. B	170—172	..	4 1 5
306,083	,,	June 28	4	Do. do. Deb. Stk.	119—120	..	3 6 8
75,000	5	Dec. 13	4	Malta & Medn., Ltd. .	4½—5*	+¼	4 0 0
560,000	100	Oct. 1	5	Met. of — 5 p.c. Deb.	105—108	..	4 12 7
250,000	100	,,	4½	Melbourne — 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9—10	−¾	7 0 0
717,946	Stk.	Aug. 9	8½	Newc'tle & G'tesh'd Con.	214—216	..	3 18 8
312,855	Stk.	June 28	3½	Do. 3½ p.c. Deb.	100—102	+1	3 8 8
150,000	5	Nov. 28	8	Oriental, Ltd. . . .	7⅞—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—7¼	..	4 19 4
15,000	5	,,	8	Do. do. 1879, £1 pd.	1⅛—1¼	..	4 11 5
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Sept. 27	7	Ottoman, Ltd. . . .	5⅞—5¾	..	5 12 0
851,070	10	Oct. 11	7	River Plate Ord. . .	10—10½	−¼	6 13 4
250,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd. . . .	11—12	..	6 13 4
135,000	Stk.	Sept. 12	10	Sheffield A	242—244	..	4 2 0
209,984	,,	,,	10	Do. B	239—241	−3	4 3 0
523,498	,,	,,	10	Do. C	239—241	−3	4 3 0
5,761,885	Stk.	Aug. 15	5	South Met., 4 p.c. Ord.	123—125	..	4 0 0
1,627,965	,,	July 17	3	Do. 3 p.c. Deb. . .	92—94	+½	3 3 10
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	102—106	..	4 14 4
70,825	,,	July 17	4	Do. 4 p.c. Deb.	104—109	..	3 13 5
120,000	Stk.	Aug. 29	5½	Tottenham and Edmonton — A. 5 p.c.	122—127	..	4 6 8
250,520	,,	,,	4	Tottenham and Edmonton — B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.	7½—8½	..	5 17 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95—100	..	5 0 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9½—10½	..	4 5 9
172,000	10	,,	6	Do. 7 p.c. . .	12½—13½	..	4 8 11
140,900	Stk.	June 28	4	Do. 4 p.c. Deb.	107—112	..	3 11 5
				WATER COMPANIES.			
780,599	Stk.	June 28	11⅜†	Chelsea, Ord. . .	320—330	..	3 9 8
150,000	,,	,,	5	Do. 5 p.c. Pref. .	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Oct. 11	7	East London, Ord.. .	200—205	..	3 8 4
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	140—145*	..	3 2 1
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	95—97*	..	3 1 10
700,000	50	Dec. 13	8	Grand Junction — 10 p.c. max..	113—116*	..	3 9 0
310,000	Stk.	Sept. 27	4	Grand Junction — 4 p.c. Deb..	122—126	..	3 3 6
708,000	Stk.	Aug. 15	14	Kent	300—305	..	4 11 10
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—205	..	3 8 4
1,043,800	100	June 28	10½	Lambeth, 10 p.c. max..	298—303	..	3 9 4
406,200	100	,,	8	Do. 7½ p.c. max..	217—222	..	3 12 1
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
500,000	100	Aug. 15	12 8/10	New River, New Shares	395—405	..	3 3 2
1,000,000	Stk.	July 31	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	Dec. 13	7	Southwark and — Ord. . . .	195—200*	..	3 10 0
126,500	100	,,	7	Southwark and — 7½ p.c. max.	182—187*	..	3 14 10
489,200	Stk.	,,	5	Southwark and — 5 p.c. Pref..	150—155*	+2½	3 4 6
1,019,585	,,	Oct. 11	4	Vauxhall — 4 p.c. A Deb.	124—129	..	3 2 0
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	280—290*	−2½	3 9 0
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	137—142*	+1½	3 3 5
200,000	,,	Sept 12	3	Do. 3 p.c. Deb. .	94—97	..	3 1 10

* Ex div.

† Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Arbroath Gas Corporation have acted with remarkable promptitude in the selection of a Manager for their works. The appointment was made on Thursday night, just a week after the applications were received, and at the first meeting of the Corporation. It was, too, a unanimous appointment; the choice falling upon Mr. A. C. Young, of Kelso. There were 23 applications for the post. Mr. Young is a native of Perth. He has been Gas Manager at Auchterarder, Maybole and Kelso. When he was at Auchterarder, by the introduction of the Peebles oil-gas process and other adaptations, he was able to reduce the price of gas by 1s. 1½d. per 1000 cubic feet. After seven years' service there, he went to Maybole—from a make of about 3 million cubic feet to one of 9 million cubic feet a year. He was eight years in Maybole; and in that time he reduced the price of gas by 1s. 3½d. per 1000 cubic feet. The Directors were wishful to retain his services by offering him an increase of salary. He went, however, to Kelso, where the make of gas is 17 million cubic feet a year. This was four years ago. There he also effected great improvements. Chiefly by obtaining a higher yield of gas per ton of coal, he was able to effect a reduction of 11d. per 1000 cubic feet in the price. Mr. Young is his own engineer in all the works he carries out. He holds the technological certificates of the City and Guilds of London Institute for proficiency in gas manufacture and distribution, and other subjects. For a year he was Secretary of the Waverley Association of Gas Managers; and he is at the present time President of that body. When it is mentioned that the make of gas at Arbroath is 64 million cubic feet a year, it will be seen that his career has been a uniformly upward one. Gas is being sold in Kelso at 3s. 6½d. per 1000 cubic feet, and in Arbroath at 4s. 2d.; so that there would appear to be room for a reduction in the latter place. But it need not be assumed that this will take place, because the works are badly situated and heavily burdened. It should not be forgotten, too, that in the immediate future the pathways may not be all peaceful; because, after so violent an unshipment as has taken place, it usually requires time for the governing body to settle down. I may congratulate Mr. Young on his appointment, and hope things will go smoothly with him.

For several years the lighting of the burgh of Cowdenbeath has been a source of anxiety to the inhabitants. A private Company provided a supply of oil gas for about a dozen years, as an attempt to introduce acetylene through the old pipes proved a failure. The works were burned down some time ago, and overtures were made to the Town Council with a view to the whole of the lighting being taken over by the burgh. The only result, however, was that the Council decided to adopt electric lighting for the streets; and a new Company has laid down plant for supplying shopkeepers and householders with coal gas. The new works, which were opened on Thursday by Provost Mungall, are so arranged that about 30 million cubic feet of gas per annum can be produced; but the present capacity of the plant is only about 15 millions.

The Corporation of Dumfries two-and-a-half years ago obtained a Provisional Order empowering them to supply electricity in the burgh. They have not as yet been able to proceed with the fitting up of an installation; their difficulty being as to the motive power to be used. They first considered water, but were advised, on consulting an engineer, that they could not employ water profitably for the purpose. Their affection is now going out towards Mond gas for the driving of the dynamos. Provost Glover was introduced to Dr. Ludwig Mond and several distinguished scientists who have faith in the utility of the gas; and he has come to be of the same opinion. He has been assured that Mond gas is bound to make a revolution in the cost of electric lighting. In the Town Council the other night, the Electric Light Committee recommended that a deputation should be sent to Manchester to obtain information as to what is being done at Old Trafford. A long discussion took place upon the proposal; the opposition being in favour of appointing an engineer to advise them upon so intensely technical a subject. The Committee had their way; and the deputation are to go about their work with as much expedition as possible, so as to get quit of the taunt that they are delaying the introduction of the electric light.

An incident of an unpleasant nature occurred on Monday at the close of a meeting of the Dunfermline Town Council. Mr. Dick complained that when he called upon the Gas Manager (Mr. A. Waddell), for the purpose of paying his gas account, the Manager ordered him out of the place; and he maintained that no servant should be allowed to insult a councillor. The Council objected to the way the subject was brought up; considering that it should be by regular complaint, and should be first looked into by the Council. As it was, Mr. Waddell was not being heard in defence of his conduct. Mr. Dick was thus stopped on this occasion, but intimated that he was only allowing the matter to drop in the meantime. Mr. Waddell's version, I understand, is Mr. Dick called in a private capacity, and criticized the management in an offensive and undeserved way. I mention the matter because it is likely to be heard of again.

The Elie Town Council sat yesterday as a court of appeal upon the question of the imposition of special water rates upon shops, which is the occasion of a good deal of heart-burning in Scotland. Four appeals were heard. Mr. H. Watson, who represented the appellants, contended that the Council had no right to levy such an assessment as a "rate" on rental. If they did not give shops the benefit of a rating on the fourth of their rental, as provided for under the Burgh Police Act, they must dispose of their surplus water by agreement, and not by a "special rate;" and before the Council could depart from the statutory rule of assessing shops on one-fourth of their rental, they must resolve that "special circumstances" existed within the burgh. No such resolution had been passed by the Council. He asked them to show their statutory authority for levying the rate. They could not do so, for they had no authority. The rate, then, appeared to him to be a pure invention, and distinctly illegal. Mr. W. T. Ketchen, for the collector, said that they

Telegraphic: "Fortress, Donnington, Salop."

C. & W. WALKER, LTD.

Telegraphic: "Fortress, London."

Telephone No. 12, WELLINGTON, SALOP.

MIDLAND IRON-WORKS, DONNINGTON, NEAR NEWPORT, SHROPSHIRE.

CODES USED, A.B.C. & A1.

London Office: 110, Cannon Street, E.C.

PURIFIERS.

TOWER SCRUBBERS.

WECK'S PATENT CENTRE-VALVE.

CRIPPS' PATENT GRID VALVES.

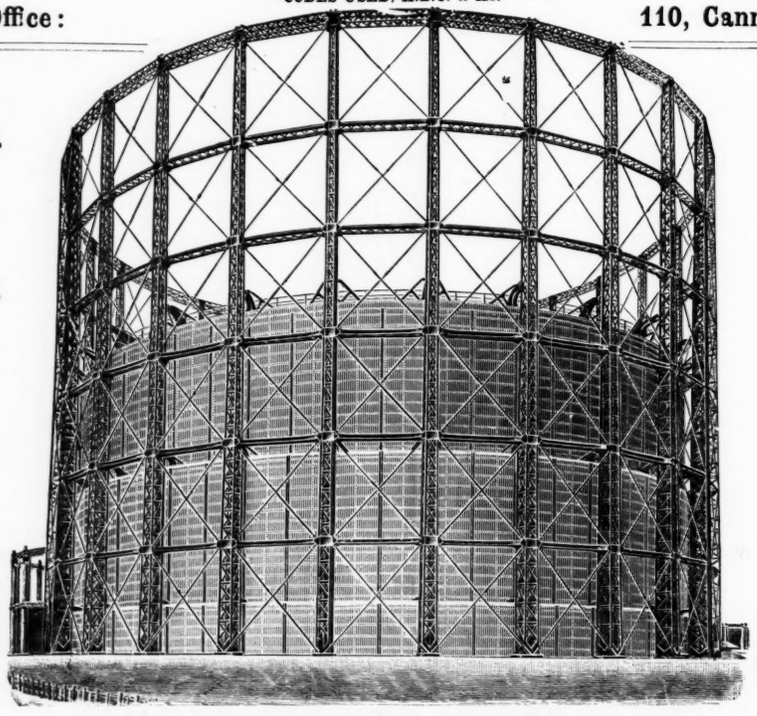
MILBOURNE'S PATENT GAS PURIFIERS.

MILBOURNE'S PATENT AUTOMATIC COVER FASTENER.

CONDENSERS.

TAR PLANTS.

SULPHATE OF AMMONIA PLANTS.



WASHERS.

WASHER-SCRUBBERS.

CLAUS' SULPHUR RECOVERY PLANT.

CENTRE AND FOUR-WAY VALVES.

MILBOURNE'S PATENT GRID-VALVES.

HYDRAULIC MAIN VALVES.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

GASHOLDERS.

had power to levy the rate. The common-sense view was not often the legal view; but in this case both law and common-sense supported his contention. The Council considered the appeals in private, and decided to sustain them all.

Mr. Baxter, of Leith, in a speech at a meeting of the Edinburgh and District Water Trust on Thursday, which was not couched in a complimentary or complaisent tone, said they were spending thousands of pounds of public money in remedying defects in the works; and it was time to know what was the cause of them, and who were responsible, and to see that the other works to be completed were in good order. He would give them the figures of the outlay in connection with the Talla works up to Oct. 31 of this year. Heritable properties had cost £46,386, railways £64,630, surface damage £5161, aqueducts (including way-leaves) £299,381, Talla reservoir £90,419, Fairmilehead £75, general expenses £15,611, the 1895 Act £6533—in all, £528,200. This total did not include £250,000 for the price of ground at Fairmilehead, nor probably £30,000, £40,000, or £50,000 expended in litigation. Neither did it include the 10 per cent. of deposits retained on the various contracts. His conviction was that, if the accounts were squared, it would be found that they were within a fraction of £600,000; and if they took £200,000 as the cost of the filters to be constructed at Fairmilehead, they were brought up to £800,000. Then, as to the contracts, only 75 per cent. of the work on contract No. 2 had been done, and they had already expended £18,000 more than the estimated total of the contract. Other works were going on in the same ratio. He had no doubt they should have to borrow £500.000 more than the parliamentary estimates. In fact, it looked as if they were being led into the same difficulty as that in which Edinburgh had been landed in connection with its tramways, the cost of which began at £500,000, and ended at £1,250,000. He wanted to prevent a repetition of that sort of thing. The question under discussion was the cost of the proposed filters, and it was remitted to a Committee to consider.

New Gas-Works for Aberavon.—The Aberavon Town Council held a special meeting last Wednesday to consider the recommendation of the Gas Committee to adopt the report and estimate of Messrs. Thomas Newbigging and Son for the erection of new gas-works in the Victoria Road. Messrs. Newbigging provided for an annual make of 50 million cubic feet, against the present output of 27 millions, which was much beyond the capacity of the existing works. The Council adopted the report with only three dissentients. It should be stated that space has been reserved for the erection of electric light plant, if the Council should at any time deem it necessary. The total estimated cost is put at £11,333. Upon the site of the proposed works already stand a comparatively new gasholder of 125,000 cubic feet capacity, capable at any time of being telescoped, and also a manager's house. The retort-settings are to be on the regenerative principle; and every modern improvement in gas-works construction has been introduced. It is hoped that the new works will be completed, at latest, by the end of next summer.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 14.

Sulphate of Ammonia.—The weakness since the close of November has been more pronounced during the week, and prices are again easier at all points. The closing quotations are £10 17s. 6d. per ton f.o.b. Leith, £10 16s. 3d. f.o.b. Liverpool, and £10 15s. f.o.b. Hull. Scotch makers, having contracts against which to deliver, have been fairly comfortable; and the sales at Leith have been mostly second-hand. Elsewhere supplies have been more abundant, and have only partly been disposed of, at a decline; buyers being altogether indifferent. There has been direct inquiry for January delivery; but in this position buyers' views are not above current prompt prices. Nothing has transpired in the forward position; and the attitude of sellers and buyers remains as last reported.

Nitrate of Soda is steady at 9s. 3d. per cwt. for ordinary, and 9s. 4½d. for refined quality, on spot.

LONDON, *Dec.* 14.

Tar Products.—The demand for pitch continues very strong; and owing to the low rates of freight, very good prices could be realized in London if makers would offer for early shipment. There is rather more offering in the North for January-June; makers considering it wise to place their production forward. The demand for South Wales is still very good for prompt delivery; but there is scarcely so much inquiry for delivery all over next year, several fuel makers showing a disposition to wait before contracting forward at the present high prices. 90 per cent. benzol is scarcely so firm. Business is reported at 11d. for prompt delivery. In 50-90 per cent. consumers are still open to purchase at 9½d.; but there is nothing offering at the moment. Carbolic remains in about the same position; there being a fairly good demand for early delivery. Business has been done in 60's at 1s. 11d. January-March; while 50's have found a fairly ready sale at 1s. 7½d. over the same period. As regards crystals, 39-40's appear to be neglected, and there is scarcely any demand; but a fairly good business is doing in 34-35's, though the orders are not large. Creosote remains unaltered; but there is rather more offering in the North and Midlands. Doubtless, however, the position will be improved when the large railway companies have completed their contracts, which is expected to be the case during the present month. As regards anthracene, there is really nothing to report. Consumers appear willing to pay 2½d. per unit for next year, but only for the very finest quality, with a minimum of 45 per cent.; while as regards the "B" qualities, 30-35 per cent., they are absolutely unsaleable. There is nothing fresh to advise in tar; but quotations are certainly well maintained.

The average values obtaining during the week are: Tar, 15s. to 18s. Pitch, east coast, 35s. 6d. to 36s. 6d.; London, 37s. 6d.; west coast, 34s. to 34s. 6d. Benzol, 90's, 11d.; 50's, 9½d. Toluol, 10d. Crude naphtha, 4½d. Solvent naphtha, 11d. Heavy naphtha, 10d. Creosote, North, 1⅛d.; London, 1¾d. to 1⅞d. Heavy oils, 2⅛d. to 2¼d.

WELSBACH

SELF-INTENSIFYING KERN BURNER

Giving a Lighting Efficiency of 300 CANDLES PER BURNER with about 10 Cubic Feet of Gas

AT ORDINARY PRESSURE.

Dispensing entirely with Auxiliary Compressing Plant of any kind whatever.

Specially Suitable for Lighting Large Areas.

The most Economical and Efficient System on the Market.

The Welsbach Shadowless Lantern, with Self-Intensifying Welsbach-Kern Burner.

FOR FURTHER PARTICULARS APPLY TO THE

WELSBACH INCANDESCENT GAS-LIGHT CO., Limited,

PUBLIC LIGHTING DEPARTMENT, YORK STREET, WESTMINSTER, LONDON, S.W.

Carbolic acid, 60's, 1s. 11d. Naphthalene, 60s. to 80s.; salts, 30s. to 45s. Anthracene, "A," 2d. to 2¾d.; "B," 1d. to 1¼d.

Sulphate of Ammonia.—The market is decidedly easier, and there does not appear to be much demand for prompt delivery. As regards Beckton, the Gaslight and Coke Company maintain their prices; but dealers are offering on Beckton terms at £10 17s. 6d., and this price is reported to have been accepted by one of the largest London Companies for prompt delivery. In Hull, business has been done at £10 18s. 9d., January shipment; but for prompt, £10 16s. 3d. to £10 17s. 6d. is the outside value. The position at Leith is unchanged. Consumers are not anxious to purchase, and at present decline to pay over £10 17s. 6d. for December shipment. The Liverpool market is reported to be easier; there being no demand for early shipment. It is not to be expected that any great improvement can take place this month, as the approach of the holidays will decidedly interfere with business.

COAL TRADE REPORTS.

Lancashire Coal Trade.—There is just at present some pressure upon the better qualities of round coal suitable for house-fire purposes, owing to extra buying prior to the holidays; but it is nothing really exceptional, and prices are not more than firm at the full list rates. Pits are kept on full time, and in many cases are filling up out of stock to meet present urgent requirements. The lower qualities of round coal are moving off very readily, for house-fire consumption, gas making requirements, and steam and forge purposes. Prices for all descriptions of round coal average 15s. per ton at the pit for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four-feet and seconds Arley, 11s. to 11s. 6d. for common house coal, and 9s. to 9s. 6d. for steam and forge coal. Engine fuel still maintains the slight improvement reported of late; and although the output of slack is necessarily increased, with the larger demand for screened round coals, there is no actual surplus in the better qualities that is being pushed upon the market by Lancashire collieries, who are all very firm at full quoted rates, averaging 7s. to 7s. 6d. per ton at the pit. Inferior sorts of slack are still plentiful, and considerable quantities continue to be sent in from Derbyshire and Staffordshire at very low figures; but perhaps the cutting in these is not quite so keen as recently. At the pit, common Lancashire slacks average about 5s. 6d. to 6s. per ton, with slacks from Derbyshire to be bought at from 2s. 6d. up to 4s. for better sorts, and from Staffordshire at about 4s. 6d. to 5s. for medium qualities. The shipping demand is fairly good; and slightly better prices are ruling—10s. 3d. to 10s. 9d. per ton delivered at the Mersey ports representing about average figures. The coke trade is steady at recent quotations—from 22s. to 24s. per ton for best Lancashire foundry cokes, and 14s. to 15s. for best washed furnace cokes at the ovens.

Northern Coal Trade.—Great activity and rather higher prices for coal for prompt delivery have characterized the coal trade of this district the last few days. In a measure, this may be due to the larger demand through the growth in consumption of coal; but the desire to get away as much as possible of the quantity contracted for during the period of the last few weeks of the freedom from taxation, has something to do with the pressure for early delivery. Best steam coals are now about 11s. 9d. per ton f.o.b., unscreened steams 9s. 9d., and steam smalls 6s.—with a strong demand for delivery within the next fortnight. The gas coal trade is now extremely brisk—the large output being fully taken up, and there being some scarcity; and thus there is little for sale beyond the quantities needed for the contract supplies, which are at their heaviest. Best Durham gas coals, for prompt delivery, are quoted 12s. 6d. per ton f.o.b.; while for contracts over next year, about 10s. per ton f.o.b. is now the current quotation. The gas coal collieries seem to be working better than they were. In coke, there is a good demand at rather higher prices for some qualities. Best Durham coke is 18s. 6d. per ton f.o.b.; blast-furnace coke is 17s. Gas coke is unaltered in quotation for shipment; but at Darlington the prices have been raised for domestic consumption.

Scotch Coal Trade.—There is no change to record, and none need be looked for this year, because the effect of the coal tax will require to be felt before prices will vary to any extent. The quotations are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 6d. to 11s. 6d., and splint 11s. to 11s. 6d. The shipments for the week amounted to 190,305 tons—a decrease of 6596 tons on the previous week, and of 8483 tons as compared with the corresponding week of last year. For the year to date, the total shipments have been 9,325,777 tons—a decrease of 1,024,548 tons upon the same period of last year.

The Oldham Appointment.—No decision has yet been come to in regard to filling the position of Manager of the Oldham Gas-Works, rendered vacant by the death of Mr. John Chadwick. In response to the invitation of the Gas Committee, 35 applications for the appointment were received; and this number was first reduced to 19, and then to 8. The Committee had a prolonged sitting on Monday last week, when each of these candidates was interviewed at some length. In the result, it was decided to visit several of the towns from which they came; so that the final selection will not be made for a week or two.

London County Council and the Transfer of Mains to Subways.—At the meeting of the London County Council to-day, the Improvements Committee will report, in connection with the widening of Southampton Row, that they have arranged with the several companies owning mains, pipes, cables, &c., in the parts of the thoroughfare affected, for the relaying of them in the subways now being constructed by the Council. These works for the section of the improvement in course of execution are almost completed; but the only accounts at present received are two from the Gaslight and Coke Company, amounting to £38 4s. 6d. and £143 19s. 6d. The accounts cover the cost of work done by the Company in removing pipes belonging to them from the portion of Kingsgate Street now closed, and also the work done in taking up pipes in Southampton Row and relaying them in the new subways. The Committee state that the charges made are reasonable; and they have given instructions for the accounts to be paid.

"SLOT" COOKER INSTALLATION.

Our Gas-Fires are proclaimed the most Brilliant and Best Finished procurable.

Overheard in Railway Carriage:—

? Did ever an "Easy Payment System" profit anycne except the so-called Benefactors who trade on these terms?

Don't tie yourself and Consumers to **any** Cookers, but wait just a few days and see the

"ROYAL WINDSOR."

It is the most up-to-date and cheapest Slot Ccoker in the Trade. Made in three sizes.

FIRST-CLASS WORKMANSHIP.
MOST MODERN DESIGNS.
FIRST AND LOWEST COST.

CONTRACTS ARRANGED FOR ONE, THREE, OR FIVE YEARS.

On show at Gas Engineering Exhibition, Crystal Palace, December 14 to January 11, 1901-1902.

Our Gas-Fires are proclaimed the most Brilliant and Best Finished procurable.

The Imperial Stove Company,

OLD TOWN FOUNDRY, **LEAMINGTON SPA.**

Bradford and the Charge for Water for Trade Purposes.—At the meeting of the Bradford City Council last Tuesday, Mr. Gadie moved that it be an instruction to the Water Committee to take into consideration and report upon the advisability or otherwise of revising the charges made for trade purposes, so that not less than cost price be charged to all consumers. Mr. Johnson seconded the motion. Mr. Spencer moved, as an amendment, that the Committee be instructed to draw up a scale of prices which would ensure that water should not be supplied to trade consumers under cost. Mr. Jowett seconded the amendment; remarking that he thought Mr. Gadie's was nothing but a "pious resolution." Mr. Gadie said he accepted the amendment; and it was thereupon carried.

Gas v. Electric Lighting in Salisbury.—From what took place at the meeting of the Salisbury Town Council a few days ago, there is likely to be "a battle of the lights" in the city. Our readers are aware that the Gas Company are at present in possession of the streets with an incandescent system, which is giving satisfaction; but the Electric Light Company think they would like to have a "look in." On the above-named occasion, the Town Clerk read a letter he had received from the Company asking to be allowed to tender for (1) the whole of the street lighting, the principal streets to be lighted with arc lamps and the others with incandescent lamps; or (2) for the lighting of the principal streets with arc lamps only. He said he had also received a communication from the Company stating that they would be pleased to put up a pair of arc lamps at their own expense, in order to give the members of the Council an opportunity of judging of the comparative value of this method of lighting. He likewise read a letter from the Gas Company, urging that no reason existed why the present contract with them should terminate at the request of the Electric Light Company, in order to afford them another opportunity of reconsidering their tender, which was very much higher than the Gas Company's, and that, although since the date of the contract 120 additional lamps had been erected in various parts of the city, the total cost for the twelve months ending Sept. 30 last was only £770. The present lighting was admitted to be satisfactory, and the public could judge from examples in the city whether electricity offered any tangible advantage as compared with gas. The writer of the letter went on to enumerate a number of authorities who had decided to use gas instead of electric light, and added that the Company had provided, at their own cost, the lanterns, burners, and other apparatus necessary for the new system, altered the position of several lamps, and subsequently fitted up the 120 additional lamps. The first half of the contract period was occupied by this work, and many of the alterations had not been two years in use, during which time the cost of the production of gas had greatly increased by the rise in the price of coal. Under the contract, the whole of this large expense had fallen on the Gas Company. Mr. Haskins moved that the request of the Electric Light Company should be acceded to; but an opinion was expressed that it would be unjust to terminate the contract with the Gas Company after putting them to great expense to meet the Council's requirements. The motion was carried by nine votes to six.

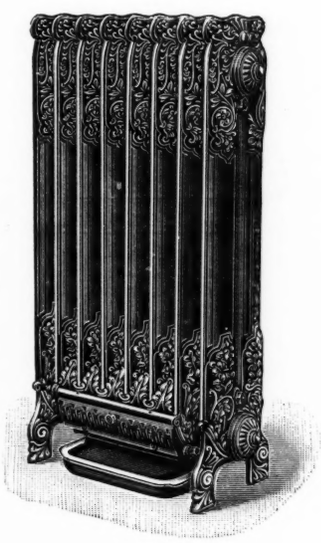
New Water-Works for Otley.—Last week, the Otley District Council let the contract for the construction of the new reservoir at March Ghyll, Middleton, near Ilkley, to Messrs. H. Arnold and Son, of Doncaster. The contract price is £49,500. The works are to provide an entirely new supply of water by gravitation to Otley.

Birmingham Corporation Bills.—The Birmingham City Council having decided to promote two Bills in the next session of Parliament (*ante*, p. 1543), town's meetings were held on Monday of last week to consider the matter. On the motion of Alderman Lawley Parker, seconded by Mr. Hunt, a resolution authorizing the Corporation to apply to Parliament for the powers contained in the Water Bill, was carried with half-a-dozen dissentients. The proceedings at the subsequent meeting (at which the "Omnibus" Bill was considered) were, however, of a much more lively character. Alderman Beale explained at great length, and amid unceasing interruption, the objects of the measure. The mention of the purchase of land for gas-works purposes at Erdington was received with hisses, upon which the Alderman remarked: "Of course, the Erdington people do not like it; but nobody will like it wherever you put gas-works." When the resolution for the promotion of the Bill was put to the meeting, it was lost by an overwhelming majority. Alderman Beale thereupon demanded a poll, which it was agreed should be taken on the three following days. The result of the poll was declared on Friday, and proved to be an overwhelming defeat of the Corporation proposals. The Bill is therefore dead, for the present year at any rate.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., on Monday last week, Mr. Alfred Richards, in conjunction with Mr. W. Ashmole, sold, by order of the Directors, £10,000 of ordinary "C" stock of the Ilford Gas Company, ranking for a standard dividend of 5 per cent., subject to the sliding-scale; the dividend on the Company's existing "C" stock having been at the rate of 6 per cent. per annum. The prices realized ranged from £110 to £111 per £100 of stock; the average being £110 8s., yielding £5 8s. 8d. per cent. on the investment. On Tuesday last, Mr. R. M. Tate offered to public competition at North Shields £10,000 of new 5 per cent. stock in the Tynemouth Gas Company. The prices realized ranged from £108 10s. to £114 per cent.; the average being £109 10s. On Monday of last week, 250 additional £10 shares in the Great Marlow Water Company, Limited, were sold by auction by Messrs. Lawrence and Son. They realized an average of £11 12s. 3d per share; the prices varying from £11 10s. to £12. On Monday evening of last week, Mr. C. F. Moore sold 32 original £15 shares in the Cirencester Gas Company and 15 bonus shares of £6 5s. each; the former having borne dividends of 9½ per cent. and the latter of 4¾ per cent. The first-named sold at from £31 10s. to £32 per share; and the bonus shares realized £6 15s. each. At a recent sale by Mr. Horton Ledger, five £10 "B" shares in the Eastbourne Gas Company sold for £24 each. Fifteen fully-paid £5 shares in the Burgess Hill and St. John's Common Gas Company, the dividend on which is 5½ per cent., realized at the same sale from £4 17s. 6d. to £5 each. The Wrexham Water Company have recently sold by tender 300 new ordinary £10 shares; the average price realized being £13 3s. 8d. per share.

Wright's . .
"EUREKA"
Gas-Fires. .

Oldest . . . . .
Established. . . .
Newest . . . . .
Designs. . . . .



The "St. Patrick"
Condensing-Stove.

JOHN WRIGHT & Co.,
Essex Works, ...
Aston, ...
Birmingham. . . . .

The "Sirdar"
Reflector Stove.

St. Helens Water Supply.—At the last meeting of the St. Helens Water Committee, it was reported that the Local Government Board had sanctioned the proposed borrowing of £30,000 for the purchase of land at Brown Edge and the construction of a reservoir thereon.

Blaina and Brynmawr in Darkness.—During the gale which prevailed at the beginning of last week, the roof of the retort-house of the Blaina Gas-Works was blown down, and so damaged the retorts that the whole of the Blaina and Brynmawr district was left without gas. Oil and candles had to be resorted to generally; and Brynmawr Railway Station was illuminated by means of carriage and other lamps.

Walsall Manufacturers and the Price of Gas—A deputation from the Walsall Chamber of Commerce waited upon the Walsall Town Council at their meeting yesterday week, in order to present a numerously signed memorial from local manufacturers, urging that there should be a reduction in the price of gas supplied for motive and heating purposes, and that there should be differential prices according to the amount of gas consumed. This view was supported by gentlemen who pointed out the possibility of the introduction of Mond gas into the borough, and urged that the present high price of gas tended to enormously diminish the consumption. In all adjacent towns in which the gas undertaking was in the hands of the local authorities, there were differential rates. The Mayor proposed that the consideration of the question should be referred to the Gas Committee; and Mr. Brownhill, in seconding, said the only point upon which there was any likelihood of concessions being made was with regard to the price for motive power. The resolution was carried.

A Somersetshire Town in Darkness.—Owing to some unaccountable want of foresight, a change of retorts had to be made a week or two ago in the gas-works supplying the little town of Langport, in Somersetshire, with the result that the place was plunged in darkness. It was thought at first that the suspension of the gas supply would be of only short duration; but, with slight intermission, the failure continued throughout the week ending the 7th inst. Great inconvenience was experienced on Sunday evening, the 1st inst., at the Congregational Church. The almost crude gas that had been made during the day was available for lighting; and its impurities compelled some persons to leave the building. After the services, the lamps were turned out, and people groped their way as best they could—some with lanterns, and others with pieces of candle in their hands. On Thursday there was again no gas to speak of, even for domestic lighting; and lamps and candles were requisitioned for the illumination of the shops—the streets, of course, being in darkness, except for a few rays of light from the establishments burning oil. After closing time (half-past seven), total darkness reigned. It is stated that the Parish Council intend seriously taking up the question, as it is contended that this lamentable condition of things could have been easily avoided by changing the retorts in the summer months. Happening at this time of the year, the breakdown at the gas-works has been a most disastrous occurrence to business people and shopkeepers, and has caused much indignation.

New York Flooded.—According to a telegram sent to the "Daily Express," a large water-main burst last Tuesday evening in New York, and flooded the fashionable neighbourhood of Madison Avenue. A column of water 2 feet thick was thrown up 10 feet, and this huge fountain played for three hours, millions of gallons of water sweeping the streets. The basements of the buildings were much damaged, and the walls of two churches seriously weakened. The next day the district was without water, while the main, which is said to be fifty years old, was repaired.

Huddersfield Corporation Bill.—A special meeting of the Huddersfield Town Council was held last Tuesday, to determine the expediency of an application being made to Parliament next session for the construction of additional works in connection with the water supply, the diversion and impounding of water, and other purposes. Alderman R. M. Shaw (the Chairman of the Parliamentary Committee) proposed that the Bill should be promoted. Alderman J. A. Brooke, in seconding the motion, said that, as regarded the water supply, the necessity to go to Parliament arose from the failure of the new reservoir at Butterley to hold water. He trusted the Bill would be allowed to pass without opposition, considering the exceptional situation in which the Corporation were placed. The Mayor (Alderman E. Woodhead) said he understood that the Council would have an opportunity of discussing the details of the Bill when they were prepared. The resolution was carried unanimously.

Entertainment to the Employees of the South African Lighting Association.—The eve of the birthday of His Majesty the King, was chosen by Mr. W. Arnott, the Manager of the South African Lighting Association, for giving the employees their sixth annual entertainment. In the course of the evening, Mr. Arnott alluded to the satisfactory position of the Association, and added that their prospects had never been more encouraging than they were now. The output of gas this year would be more than 62 million cubic feet—nearly twice the quantity made five years ago. He went on to give an account of his visit to the Glasgow Exhibition, and spoke highly of the display of incandescent gas lighting there. He said he had visited a number of towns in England, and ventured to assert that Port Elizabeth was better lighted than the average English town of the same size—many of them, in fact, not having any incandescent lights at all. He extolled the lighting of Liverpool, Paris, and Brussels. Reverting to the affairs of the Association, he cited the decision to let gas-stoves on hire as an innovation which promised to be very successful. A very serious matter had been the great increase in the price of coal, which was now 15s. per ton more than it was a year or two ago. Notwithstanding this, the price of gas had not been increased, although in England it had been raised about 6d. per 1000 cubic feet. Some few years ago it was 17s. 6d., and at a time when coal was £1 cheaper per ton. Now it was 7s. 9½d. per 1000 cubic feet for cooking purposes. Considering what coal cost in Port Elizabeth as compared with other places, it could be asserted that the Association supplied the cheapest gas in the world—a fact which spoke well for the employees.

Crystal Palace
Gas
Exhibition.

Stands
32
33
and
34

See
Richmond's
New
Fires.

Proposed Amalgamation of Gas Companies.—The "Nottingham Daily Express" states that negotiations are pending for the amalgamaton of the Duffield Gas Company with the Derby Gas Company.

Secret Commissions in the Coal Trade.—As a result of startling disclosures at a Lancashire Chamber of Commerce on the subject of secret commissions paid by colliery owners to employees on every ton of coal delivered to their employers, the principal coal merchants of East Lancashire held a meeting on Monday last week to consider the subject. It was unanimously resolved that no commissions or gifts should be given in their district except with the knowledge and consent of the buyers; and that any merchant violating the resolution should be expelled from the Association, and have his name published. A list is to be prepared of the firms who agree not to pay secret commissions of any kind.

Gas Poisoning Fatalities.—The deaths have been reported of two women (mother and daughter) who lived together in Ashton Lane, Middleton. It appears that the parties went to bed last Tuesday night, and were not again seen alive. Upon the door being forced, the police found them in bed quite dead. Gas was escaping from the gas-jet in the room; and the unfortunate women had been suffocated. The deceased living alone, there can only be conjecture as to the cause of the fatality; but it is thought that the last to get into bed had put the gas out, and had then accidentally turned it on again. Two servants at the Goulbourn Inn, Preston, were found lying in bed unconscious on Monday morning last week; and one of them has since died. The other is, however, recovering. It was at first thought that the cause of the accident in this case also was turning the tap too far round; but on investigation, it was discovered that the gas-pipe which ran under the floor of the bedroom had been broken in two. The girls had been cleaning the room for Christmas, and moved the bed from the position it had previously occupied, with the result that one foot of the bedstead rested on a loose board, known as the plumber's board. The weight had pressed the board down on the pipe, and cut it clean through. At the inquest, the Coroner said that no doubt the builder ought to have made proper provision with regard to this board, yet it was not such a defect as anyone could be held answerable for.

The Compagnie des Mines de la Grande Combe, of Marseilles, who have heretofore placed their contracts for tar in England, have intimated to the American Consul that if American exporters can deliver this article in Marseilles or Cette for less than 47 frs. per ton, it will not be difficult to come to terms.

The "Leader" Incandescent Light, Limited, is the title of a Company recently registered with a capital of £30,000, in £1 shares, to adopt an agreement and carry on the business of manufacturers of, and dealers in, incandescent and other lamps, burners, mantles, and apparatus, suppliers of gas and electricity, gas-fitters, ironmongers, electricians, and general engineers, &c. Among the first Directors are Mr. A. Kitson and Mr. T. P. O'Connor. There is no initial public issue.

It is reported that the men are gradually going in to work at the Penrhyn quarries. During the last three months, 103 men have returned, and the output has increased, so that it has now reached some 35,000 tons per annum.

The Cannon Iron Foundries, Limited (formerly the Cannon Hollow-Ware Company, Limited), have just celebrated their diamond jubilee; the business having been established in 1826 by the late Edward Sheldon. The name of the firm was continued as Edward Sheldon and Co. until 1884, in which year the business was converted into a private Company, taking the name of the Cannon Hollow-Ware Company, Limited; thereby emphasizing the reputation of the "Cannon" brand had obtained for the then principal lines of their manufactures. In due course, consequent upon the great development of their business by the addition of various departments, the name was further altered last year to the Cannon Iron Foundries, Limited, with the view of obviating the implied limitation of their productions to hollow-ware proper, as by this time the firm had become well known as one of the leading makers of gas-stoves for cooking and heating purposes, and other specialities. The Company is composed of the descendants of the late Edward Sheldon; and it cannot be other than gratifying to the present members of the family to be able to look back upon a continuous business record of three-quarters of a century.

A comparative statement of the burden of local rating in various English boroughs has been compiled by Mr. George Swainson, Borough Treasurer of Bolton. Three towns show local rates to the extent of 9s. in the pound and upwards—viz., West Ham, 9s. 8d. (the highest rated of any town in England and Wales), and Southampton and Wakefield, 9s. each. Six towns show rates of 8s. in the pound and upwards—viz., Rotherham, 8s. 9d.; East Ham, 8s. 8d.; Norwich, 8s. 6d.; Sheffield, 8s. 4½d.; Middlesbrough, 8s. 1d.; and Wolverhampton, 8s. The towns whose rates amount to 7s. and upwards number 25—viz., Hull, Northampton, Reading, York, Leeds, Oldham, Rochdale, Nottingham, Bradford, Halifax, Salford, Leicester, Bristol, King's Lynn, Plymouth, Coventry, Burton-on-Trent, Macclesfield, Huddersfield, Stafford, Manchester, Dewsbury, Brighouse, and Preston. Liverpool is the largest town whose rates fall below 7s.; the total there being 6s. 9¼d. Of the towns at the other end of the scale, Lancaster with 3s. 10d. in the pound only, Barrow-in-Furness with 4s. 8d., St. Helens with 4s. 10d., Chester and Carlisle with 5s., Darlington with 5s. 1d., and Bolton with 5s. 2d., are the seven lowest. Bolton is the lowest rated of any town with upwards of 100,000 inhabitants, and Bolton and Barrow-in-Furness are the lowest rated of the English county boroughs. In a number of cases the rates are reduced by the profits of municipal enterprises, seven towns making profits out of markets, gas, water, electric light, tramways, and other undertakings to an amount equal to 1s. in the pound and upwards. Darlington made a profit equal to 1s. 8¾d. in the pound; Wigan, 1s. 7¾d.; and Bolton, 1s. 4d. in the pound. The highest lump sum of profit from these undertakings was made by Liverpool, £104,323; then Manchester, £85,000; and next Nottingham, with more than £50,000.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily.
BLACKBURN	1,250,000	WINNIPEG, MAN.	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	COLCHESTER (Second Contract)	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	YORK	750,000
COLCHESTER	300,000	ROCHESTER	500,000
BIRKENHEAD.	2,250,000	KINGSTON, ONT.	300,000
SWINDON (New Swindon Gas Co.)	120,000	CRYSTAL PALACE DISTRICT	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	DULUTH, MINN.	300,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	CATERHAM	150,000
HALIFAX	1,000,000	LEICESTER	2,000,000
TORONTO	250,000	ENSCHEDE (HOLLAND)	150,000
OTTAWA.	250,000	BUENOS AYRES (RIVER PLATE CO.)	700,000
LINDSAY (Remodelled)	125,000	BURNLEY	1,500,000
MONTREAL	500,000	KINGSTON-ON-THAMES	1,750,000
TORONTO (Second Contract; Remodelled)	2,000,000	ACCRINGTON.	500,000
BELLEVILLE	250,000	TONBRIDGE	300,000
OTTAWA (Second Contract)	250,000	STRETFORD	500,000
BRANTFORD (Remodelled)	200,000	OLDBURY	300,000
ST. CATHERINES (Remodelled)	250,000	TODMORDEN	500,000
KINGSTON, PA.	125,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
PETERBOROUGH, ONT.	250,000	YORK (Second Contract)	750,000
WILKESBARRE, PA.	750,000	ROCHESTER (Second Contract)	500,000
ST. CATHERINES (Second Contract)	250,000	NEWPORT (MON.)	250,000
BUFFALO, N.Y.	2,000,000	TOKIO, JAPAN.	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

ORDERS RECEIVED IN 1901 TO MARCH 1 . . . . 3,500,000 CUB. FT. DAILY.

MALTON . . 150,000 Cubic feet. **SMETHWICK . . 500,000 Cubic feet.**

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

CHRISTMAS HOLIDAYS.

In consequence of the CHRISTMAS HOLIDAYS, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office NOT LATER than THE FIRST POST ON SATURDAY.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

Telegraphic Address: "GASKING, LONDON."
Telephone Number: Holborn 121.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.
MELROSE CYCLE COMPANY, COVENTRY.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PROVINCIAL Gas Companies may profitably consider the advantages offered by ACETYLENE for the PUBLIC and PRIVATE LIGHTING of OUTLYING PORTIONS OF THEIR DISTRICTS, which do not at present justify the expense of laying Coal-Gas Mains from the Central Works.
Correspondence on this subject is invited by the ACETYLENE ILLUMINATING COMPANY, LIMITED, 3, Victoria Street, LONDON, S.W.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

CHEMIST (M.A. Cambridge, Royal College of Science, and Institute of Chemistry), at present engaged in directing a large teaching Laboratory, seeks appointment as a PRACTICAL CHEMIST in one of the Chemical Industries. Is an experienced Analyst. Disengaged in a few months.
Address "CHEMIST," care of G. W. Byrne, Esq., Solicitor, 14, Bell Yard, TEMPLE BAR, W.C.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDIZE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

PREPAYMENT METER WORK.
CONTRACTS are undertaken by William EDGAR for FITTING UP HOUSES, complete with the PENNY-IN-THE-SLOT INSTALLATIONS. Gas Companies or Corporations indemnified against loss through Accidents, &c. Thousands of Houses have been fitted up by me under this System. Estimates free.
BLENHEIM HOUSE, 23, Lower Mall, HAMMERSMITH.
Telegrams: "Gasoso."
Telephone No. 14 Hammersmith.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

30 Tinmen Wanted immediately (Case Makers and Finishers).
Apply to the METROPOLITAN GAS-METERS, LTD., Works, Willowbrook Road, Trafalgar Road, OLD KENT ROAD, S.E.

A SMART Man wanted to Canvass a Gas Company's District in the Country for Orders for Slot Installations.
Apply, by letter, stating Qualifications and Remuneration required, to No. 3789, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man to set Retorts and do general Bricklaying at Works near Birmingham. Must be used to Regenerative Settings. Permanent Situation to suitable Man.
State Age, Experience, Wages required, &c., to No. 3753, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Chief Outdoor Inspector.
Must be a practical Gas-Fitter, with good knowledge of Main Laying and other matters connected with the distribution of Gas.
Apply, stating Age, Experience, and Wages required, to No. 3790, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas-Stove Manufacturer, REPRESENTATIVE to Travel Scotland. Scotsman well acquainted with Scotch Gas Companies preferred.
Apply, by letter, stating Salary and Experience, to No. 3788, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a few months, a smart, steady, and experienced man as MAIN and SERVICE LAYER. He must also be used to Iron, Compo., and General Fitting Work.
Apply, with References, stating Age, where last employed, and Wages required, to E. D. SAPEY, Manager and Secretary, Gas Company, HORSHAM.
Dec. 14, 1901.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

GAS ENGINEER AND MANAGER.

THE post of Gas Engineer and Manager to this Council will be vacant, owing to the resignation of the present Manager and Engineer, in March next. The Council invite applications for the vacant post.

The average make is about 140 million cubic feet. Applicants should have a thorough knowledge of the Manufacture of Sulphate of Ammonia.

Applications, endorsed "Gas Manager," should be sent so as to reach me not later than Saturday, the 28th of December inst.

Applicants are requested to state Age, Previous Experience, Salary Required, and to furnish *copies* of recent testimonials only.

No Residence for the Gas Manager is provided by the Council.

Dated this 6th day of December, 1901.

R. W. EVANS,
Solicitor and Clerk to the Council.
Commercial Bank Chambers,
Halifax.

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.
Send for full Particulars to
BALE & CO., 122, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."
Telephone "277 HOLBORN."

GAS-TESTING.

MR. T. E. PYE (Eleven Years' Experience in Gas-Works Laboratories) is prepared to visit Gas-Works, and to REPORT to Management on Sulphur Impurities, Illuminating Power, &c., or as to general workings. Tests of Ammoniacal Liquor, Spent Oxide, &c.
No. 372, STANSTEAD ROAD, LEWISHAM.
Drawings Prepared for Works Extensions. Tracings Made.

WANTED, at once, a steady, reliable Man as STOKER. Must be a good Shovel Charger, and used to Engine and Exhauster. Wages, 35s. per week of seven days, with a Week's Holiday every Year.
Apply to the MANAGER, Gas-Works, SUNBURY-ON-THAMES.

LEEK URBAN DISTRICT COUNCIL.

WANTED, a Clerk accustomed to keeping the Carbonizing and Stock Accounts at a Gas-Works, and to assist the Manager.
Further Particulars may be obtained from
C. HENSHAW,
Clerk.
Town Hall, Leek,
Dec. 12, 1901.

BOROUGH GAS-WORKS, WIGAN.

WANTED, a General Gas-Fitter. One with a good Experience of Repairs to Cookers preferred.
Application to be made, in writing, to the undersigned, accompanied by References (not Testimonials), from whom all Particulars can be obtained.
JOS. TIMMINS,
Engineer.
Wigan, Dec. 11, 1901.

CITY OF CARLISLE.

APPOINTMENT OF GAS MANAGER.

THE Corporation of Carlisle are prepared to receive APPLICATIONS for the appointment of MANAGER of their Gas-Works.
Candidates for the Appointment may obtain a statement of the duties of the Office and Conditions of Candidature on application to the Town Clerk, Carlisle.
The Candidate to be appointed must be a duly qualified Gas Engineer and Manager, not exceeding 45 years of age, and will be required to devote his whole time to the discharge of the duties of his office.
Preference will be given to Candidates having a practical knowledge of the manufacture of Carburetted Water Gas.
The Salary will be £350 per annum clear of all expenses, with the privilege of taking not more than two Pupils at any one time. The Corporation will provide Offices and necessary Staff.
Canvassing Members of the Council, either directly or indirectly, is strictly prohibited.
Applications, accompanied by printed copies of not more than Six recent Testimonials (which will not be returned), to be addressed to me the undersigned Town Clerk, marked "Appointment of Gas Manager," on or before the 4th day of January next.
By order,
A. H. COLLINGWOOD,
Town Clerk.
Carlisle, Dec. 10, 1901.

FOR SALE.—Cornish Boiler, 14 ft. by 4 ft. 6 in., with all fittings complete. In good condition. Also Vertical STEAM-ENGINE, about 12-horse power. Can be seen at Haileybury College, Hertford.
Apply to R. WATSON, Gas-Works, HERTFORD.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD—
GASHOLDER (and Cast-Iron Tank), 17,500 cubic feet capacity.
CENTRE-VALVE, 15 in. diameter, by Walker, for Four Purifiers.
Four PURIFIERS, 10 feet square, in line, with Planed Joints, Walker Centre-Valve, Covers, and Traversing Crab Lifting Gear. Will be refixed equal to new.
Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

THE Solihull Gas Company have for DISPOSAL four ⊂ MOUTHPIECES (Tangyes patent) 18 in. by 14 in., 5-inch outlet; six Oval MOUTHPIECES (Tangyes patent), 24 in. by 15 in., 5-inch outlet; seven 5-inch ASCENSION-PIPES; four 5-inch elbow ASCENSION-PIPES; ten 5-inch H-PIPES, with Dip-Pipes cast on; also 6-inch CENTRE-VALVE for four Purifiers.

Any further Information may be obtained from Mr. T. Jowett, the Company's Manager.

Offers to be sent to the Secretary, Bank Buildings, Solihull.

F. L. THOMPSON,
Secretary.

FOR SALE, Cheap, for immediate removal—

Set of Four 12 feet square PURIFIERS, Centre-Valve, and 12-inch Connections.
ROTARY WASHER, 12-inch Connections and Three Valves, Engine, and Gearing.
ROUND STATION METER, 12-inch Bye-Pass Valve and Connections.
12-inch Patent PEEBLES SAFETY GOVERNOR.

The whole just recently replaced by larger Apparatus. For Prices or further Particulars, apply to

F. C. HUMPHRYS.

Gas-Works, Ilkeston.

THE Directors of the Ilford Gas Company are prepared to receive TENDERS for the supply of 1000 6-inch PIPES, delivered either f.o.r. Ilford Station or f.a.s. the Company's Wharf, Ilford.

Tenders, to be sent in not later than Dec. 30, to be addressed to J. H. BROWN, Engineer and Manager, Gas-Works, ILFORD.

CORPORATION OF ROTHERHAM.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply of FIRE-CLAY, RETORT, BRICKS, CLAY, &c.

Particulars can be obtained on application to the Engineer, Mr. Frank A. Winstanley.

Tenders, endorsed "Fire Goods," to be delivered to me on or before Monday, Jan. 6, 1902.

The Committee do not bind themselves to accept the lowest or any Tender.

H. HAMPTON COPNALL,
Town Clerk.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation invite TENDERS for the supply of: (1) WROUGHT-IRON GOODS. (2) STEEL GOODS. (3) IRONMONGERY. (4) IRON VALVES and CONNECTIONS. (5) FIRE-CLAY GOODS. (6) WET and DRY METERS. (7) TARRED GASKIN, &c. (8) STOKERS' GLOVES, required during the ensuing Twelve Months.

Forms of Tender and further Particulars may be obtained on application to Mr. Thomas Holgate, C.E., Engineer, Gas-Works, Halifax.

Tenders, endorsed "Gas-Works," together with the name of the article tendered for, must be sent to the undersigned before ten o'clock a.m., on Wednesday, the 1st of January, 1902.

The persons whose Tenders are accepted will be required to observe the Fair Contracts Clauses adopted by the Corporation.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
KEIGHLEY WALTON,
Town Clerk.

BOROUGH OF SMETHWICK GAS-WORKS.

GAS ENRICHING.

THE Gas Committee are prepared to receive TENDERS for the supply of BENZOL, and also of OIL suitable for the Manufacture of Carburetted Water Gas.

Analysis and full description, with a sealed sample of the Oil offered, must be sent with the Tender.

The Oil and Benzol must be delivered free at the Gas-Works, Rabone Lane, Smethwick, in such quantities and at such times as may be required by the Committee during the six months ending June 30 next.

Sealed Tenders, endorsed "Oil or Benzol," as the case may be, to be addressed to the Chairman of the Gas Committee, and delivered to the undersigned not later than the 19th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
W. J. STURGES,
Secretary.

Gas Offices, Town Hall,
Smethwick, Dec. 7, 1901.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £62,035 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £90 per Cent.

NOTICE is Hereby Given that, it is the intention of the Directors of this Company to sell by TENDER £62,035 THREE PER CENT. PERPETUAL DEBENTURE STOCK, in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.

Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and Tenders must be sent in on or before Tuesday, the 14th day of January, 1902.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower Price than at the rate of £90 money for each £100 Debenture Stock.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road,
London, S.E., Dec. 14, 1901.

THE Directors of the Worksop Gas Company invite TENDERS for the purchase of the surplus TAR and the AMMONIACAL LIQUOR made at their Works from the 1st of January to the 31st of December, 1902.

Tenders for Tar to state price per ton delivered into purchaser's tanks at the Worksop Railway Station.

Tenders for Liquor to state price per ton as tested by No. 1 Twaddel Hydrometer, delivered into boats near the Company's works, or price per ton delivered into purchaser's tanks at the Railway Station.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders to be sent in by the 30th of December.

Worksop, Dec. 13, 1901.

SLOUGH GAS AND COKE COMPANY.

INCORPORATED 1866.

SHARE CAPITAL AUTHORIZED		£50,000.
Do.	do. PAID UP	£25,000.
LOAN CAPITAL	PAID UP	£6,000.

ISSUE OF NEW ORDINARY SHARES, AND MORTGAGE DEBENTURES.

THE Dividend on the New Share Capital is limited to 7 per cent. per annum, but is subject to the Sliding-Scale which provides for the Dividend rising 3s. 6d. per cent. for every penny reduction in the price of Gas below the Standard Price of 4s. 5d. per thousand cubic feet, and falling 3s. 6d. per cent. for every one penny increase in the price of Gas beyond the said Standard Price.

The Debentures will be issued for a term of 7 years at 4 per cent. per annum; Interest being payable Half Yearly on 29th September and 25th March.

The Company was incorporated by Act of Parliament in 1866, and its district and powers were subsequently extended by Confirmation Acts in 1884, 1898, and 1901.

The new Capital is required for the erection of New Works and Plant upon the Company's New Site of 5 acres of Freehold Land at Upton Lea, to meet the continued increase in the demand for Gas for several years past. The site has a siding connection with the Great Western Railway, and also adjoins the Grand Junction Canal.

The Company has already erected a Gasholder on this site at a cost of nearly £5000, and it is now proposed to erect New Works and Plant at a further cost of £16,000.

The new Works will be constructed on the most modern principles, and will effect a great saving in the cost of manufacture. The railway siding will also be the means of a considerable saving in cartage.

The progress of the Company during the past Seven years is as follows:—

	Gas Sold.		Total Receipts.
1894.	19,386,000 cubic feet	.. ..	£5115
1895.	21,479,000 ,,	.. ..	£5736
1896.	22,068,000 ,,	.. ..	£5859
1897.	23,945,000 ,,	.. ..	£6381
1898.	26,133,000 ,,	.. ..	£6902
1899.	27,384,000 ,,	.. ..	£7377
1900.	30,852,000 ,,	.. ..	£8624

The District of the Slough Urban Council has lately been enlarged, the town and neighbourhood is improving, and the Company's mains have been, and are still being, greatly extended.

The Dividend paid on New Ordinary Shares was £7 per cent. for over 20 years to June, 1899, and since then the Dividend paid has been £7 7s. per cent., the additional Dividend being paid according to the Sliding-Scale.

At the Auction Sale on the 8th October, 1901, of the same class of Shares as is now offered, the prices realized were £15 to £15 10s. per Share.

The Shares are offered under the conditions of the Slough Gas Order, 1901, which obliges the Company to sell all future Share Capital by Public Auction or Tender.

SLOUGH GAS AND COKE COMPANY.

TERMS OF ISSUE BY TENDER OF 600 ORDINARY SHARES OF £10 EACH, AND OF 30 MORTGAGE DEBENTURES OF £50 EACH.

THE Directors give Notice that they are prepared to receive TENDERS for £6000 in ORDINARY SHARES of £10 each nominal value. Also for £1500 MORTGAGE DEBENTURES of £50 each nominal value.

Holders of Shares will be entitled to Dividend as from 28th February, 1902, and the Dividends will be payable Half Yearly, on the 1st November and the 1st May.

Holders of Debentures will be entitled to Interest at 4 per cent. per annum as from 25th March, 1902, which will be payable Half Yearly, on the 29th September and the 25th March.

Tenders must be delivered at the Secretary's Office 119, High Street, Slough,

BEFORE THE 31ST DECEMBER, 1901,

accompanied by a deposit of £1 per share on the number tendered for, and the balance must be paid on or before the 28th February, 1902.

Tenders for Debentures must be delivered at the same time and place, accompanied by a deposit of £5 per Debenture, and the balance paid on or before 25th March, 1902.

Allotment letters will be issued in the course of a few days after the last day for receiving Tenders.

Where no allotment is made, the Deposit will be returned in full, and in case of partial Allotment, the balance of the Deposit will be applied towards the payment of the Shares or Debentures allotted.

In case of default made in the payment of the balance at the proper date, the deposit previously paid will be liable to be forfeited.

Share Certificates and Mortgage Debentures will be issued in due course, free of expense, in exchange for Banker's Receipt.

Application must be made upon the printed form of Tender, to be obtained at the London and County Bank, Slough, of Mr. R. H. Barrett, Solicitor, Slough and Eton, and of the Secretary.

By order of the Directors,
ARTHUR THOMAS,
Secretary.

Slough, Bucks,
Dec. 5, 1901.

TIPTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

FIRE-CLAY GOODS.

TENDERS are invited for the supply and delivery of Machine-made RETORTS, FIRE-BRICKS, FIRE-CLAY, &c., during the next Twelve Months, all to be delivered at the Tipton Gas-Works.

Specifications and Forms of Tender may be had on application to Mr. S. O. Stephenson, the Council's Gas Engineer and Manager.

The Council do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Fire-Clay Goods," must be delivered to the undersigned not later than the first post on Monday, Dec. 23, 1901.

J. W. WARING,
Clerk to the Council.

Public Offices, Tipton.

JOHANNESBURG MUNICIPALITY.

MUNICIPAL NOTICE No. 97.

CARBURETTED WATER GAS PLANT.

TENDERS are invited for the supply and delivery of a complete CARBURETTED WATER GAS PLANT of a capacity of about 200,000 cubic feet daily.

Specification with general Plan of present works, can be obtained on application, from the Crown Agents for the Colonies, Downing Street, London, or from the Town Clerk, Johannesburg.

Tenders in sealed envelopes, marked on the outside "Tender for Carburetted Water Gas Plant," to be received by the Town Clerk, Johannesburg, on or before Jan. 31, 1902.

The lowest or any Tender not necessarily accepted.

LIONEL CURTIS,
Acting Town Clerk.

Johannesburg, Nov. 4, 1901.

LAMBETH WATER-WORKS COMPANY.

NOTICE is Hereby Given, that it is the intention of the Company to SELL BY TENDER £100,000 THREE PER CENT. DEBENTURE STOCK redeemable at par at the option of the Company on Six Months' Notice at any time after the expiration of 25 Years from the date of issue.

Particulars, Conditions of Sale, and Forms of Tender may be obtained at the Company's Office, Brixton Hill, S.W.

Sealed Tenders are to be delivered at the said Office not later than Twelve o'clock (noon) on Monday, the 6th of January, 1902.

By order,
H. WILKINS,
Secretary.

Brixton Hill, S.W.,
Dec. 3, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

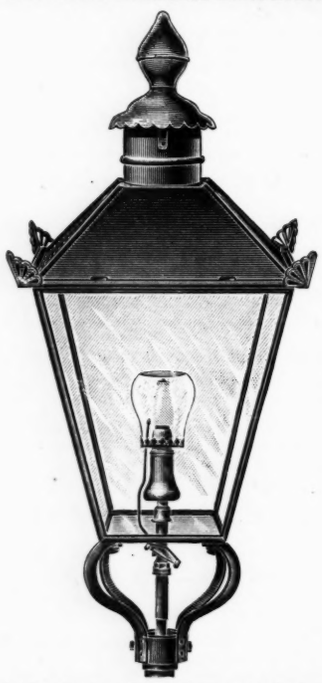
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

HARDMAN & HOLDEN, Ld.
ESTABLISHED 1820.
SULPHURIC ACID.
MADE from Spent Oxide (free from Arsenic) and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.
Head Office: Miles Platting, MANCHESTER.
Inquiries Solicited.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
Also Removal of last Traces of
SULPHURETTED HYDROGEN
in catch position.
Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

THE
"ST. HELENS" LANTERN
Fitted with Steel Enamelled White Reflector.



Write for our new Lists. Low quotations for quantities.
A. E. PODMORE & CO.,
Gas Lighting Engineers and Contractors,
25A, HATTON GARDEN, E.C.

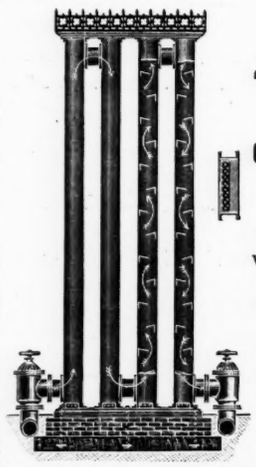
ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

HYDRAULIC BLOWER
For blowing Air into Gas Purifiers for the purpose of
REVIVIFYING THE FOULED OXIDE.
Full Particulars on application.
LUXWERKE LUDWIGSHAFEN AM RHEIN.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., Ld.,
CHESTERFIELD.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

J. FIRTH BLAKELEY & CO.
Gas Engineers, &c.,
Thornhill, DEWSBURY.

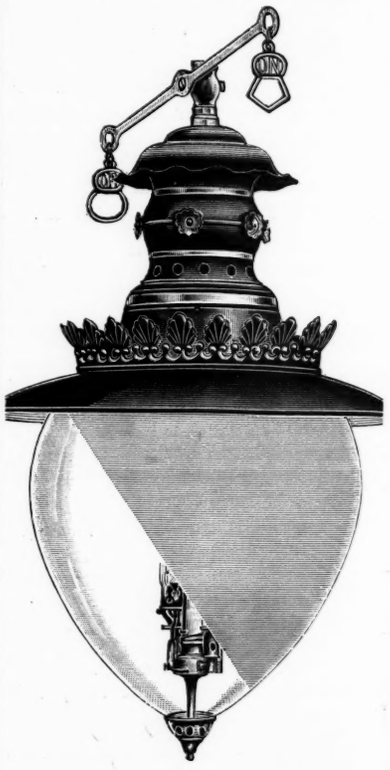


This Illustration shows a Set of
"BLAKELEYS" PATENT CONDENSERS
as Erected at Portland.
They are fitted with perforated intercepting Baffle Plates and Water arrangement.
Cheap in construction; thoroughly efficient.
Large Stock of good Second-Hand Gas Plant.
Telegrams: "BLAKELEY, THORNHILL LEES."

TROTTER, HAINES, & CORBETT, LIMITED,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

IMPROVED
"Copper" Arc Lamp,
TO SUIT
KERN BURNERS.



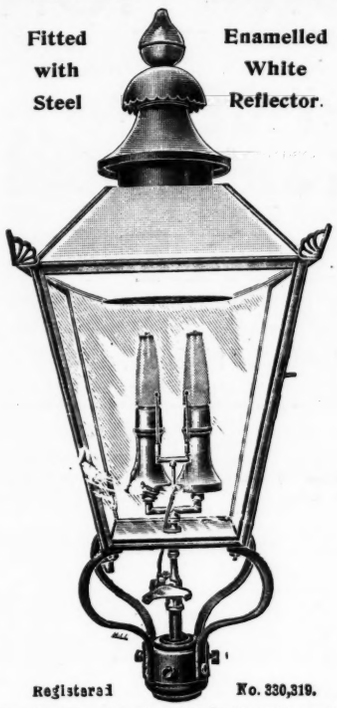
J. & W. B. SMITH,
21 & 23, FARRINGDON ROAD,
LONDON, E.C.

THE

"KILBURN" LANTERN.

Fitted with Steel

Enamelled White Reflector.



Registered No. 330,319.

The "Kilburn" Lantern (for double lights) and the St. Albans" Lantern have been adopted for lighting the Town of St. Helens.

H. GREENE & SONS, LTD.

Late of Cannon Street,

Works and Show Rooms:
19, Farringdon Road, E.C.

Registered Offices:
36, Mark Lane, E.C.

Telephone: 2669 AVENUE. Telegrams: "LUMINOSITY."

NITRATE of Thorium and Cerium, FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers:
THE WHESSOE FOUNDRY COMPANY, LIMITED, DARLINGTON.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.
165, QUEEN VICTORIA STREET, E.C.;
And at STROUD, GLOUCESTERSHIRE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,
for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE, SON, & HUNTER,

COAL OWNERS, NEWCASTLE-ON-TYNE
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C

GAS COMPANIES' BOOK-KEEPING.

A PRACTICAL TREATISE ON THE KEEPING OF GAS COMPANIES' ACCOUNTS.

By **JOHN HENRY BREARLEY**, of Longwood, and **BENJAMIN TAYLOR**, of Cleethorpes.

The only complete Treatise on Gas Companies' Book-Keeping ever published.

This book will be found invaluable to those desirous of obtaining a thorough grasp of Gas Companies' Book-Keeping and Accountancy.

A complete set of Transactions are dealt with; the same being entered into the various Books, and posted into the Ledgers. A Model Balance-Sheet is prepared from the set of transactions and postings.

Forms and subsidiary books are illustrated and described. The linking together of the various books is shown at a glance by means of a Chart.

OPINIONS OF THE PRESS.

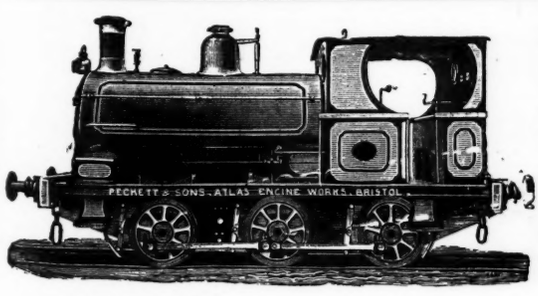
The Accountant.—"No pains have been spared by the authors to make this book complete in every respect. The system of accounts recommended is not only a model of clearness, but also fully adequate to meet all reasonable requirements. Generally the get-up of the book, and of the various forms and specimen rulings shown therein, is excellent. The work will be found both useful and reliable, while its convenience is greatly enhanced by the inclusion of an adequate index."

Gas Engineer's Magazine.—"It is difficult to speak too highly of the clearness in which the authors have set down every detail. The 'Model set of Books' appear to us to be about as complete as experience and careful thought can make them. The authors have placed within the reach of every official of a Gas Undertaking, a book that we venture to prophesy will become a standard work, and will prove the guide, philosopher, and friend of all those who are engaged in the keeping of gas-works accounts."

Leeds Mercury.—"The explanatory remarks are given in language that cannot be misunderstood."

NET PRICE: CLOTH BOUND, 12s. 6d.; MOROCCO GILT, 18s.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate Delivery.

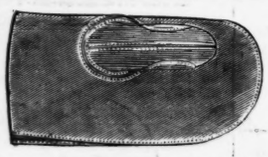
Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

THOMAS BUGDEN, MANUFACTURER OF

TAR and LIQUOR HOSE, and Special AIR TUBING.



BELLOWS made to inflate a 48-inch Bag under One Minute. Various sizes made.

Stokers' Mitts, from 13/6 doz.
Made from best Tanned Leather.

India-rubber Hose, Sheet, and Washers of every description, Leather Bands, Oils, &c., Diving and Wading Dresses, Waterproof Coats, Capes, Sewer Boots, and Theatrical Dresses.

Fire-Engine Hose and Appliances.

Best Materials and Workmanship Guaranteed.

Miners' Woollen Jackets No. 1, 12/- each; No. 2, 9/6.

Gas-Bags for Mains. Gas-Engine Bags.

71, GOSWELL ROAD, E.C.

CORONATION

PRICE LIST NOW IN PREPARATION OF **DEVICES** FOR

GAS ILLUMINATIONS

IN

New & Artistic Variety

JAMES MILNE & SON, LTD.,

EDINBURGH. LONDON. GLASGOW. LEEDS.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

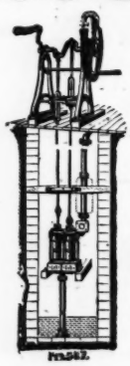
Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS SHEFFIELD."

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.



London Address:
Salisbury House, London Wall, London, E.C.

PLEASE APPLY FOR CATALOGUE No. 8.

TRADE MARK.

FIRST AWARDS EVERYWHERE.

Telegrams:
"EVANS, WOLVERHAMPTON"
National Telephone No. 7033.

See next Week's Advertisement for Steam-Pumps, Tar and Liquor Pumps, &c.

INCLINED RETORTS.

HORIZONTAL RETORTS.

RETORT BENCHES AND SETTINGS,

WITH

GENERATOR OR REGENERATOR FURNACES.

W. J. JENKINS & CO., Ltd., RETFORD.

Important Notice.

INCANDESCENT GAS LIGHTING.

All DEALERS and the PUBLIC are CAUTIONED against BUYING, SELLING or USING MANTLES which are INFRINGEMENTS of the Welsbach Company's 1893 Patent,

THE VALIDITY OF WHICH HAS BEEN CERTIFIED.

The Welsbach Company are not aware of any Mantles now being offered to the Public which are not made in accordance with their 1893 Patent.

The TRADE and the PUBLIC

ARE SPECIALLY CAUTIONED AGAINST THE USE OR SALE OF

"VOELKER" MANTLES, "GUARANTY" OR "DURA" MANTLES.
"G.I.C." MANTLES, "PERFECT" OR "PERMCO" MANTLES,

in respect of which Actions are pending against the Manufacturers.

The Welsbach Company will continue to take action against all Users of, or Dealers in, the above-named Mantles, who are personally responsible no matter what Indemnities may have been given.

INTERIM INJUNCTIONS HAVE BEEN OBTAINED AND CONFIRMED BY THE COURT OF APPEAL,

in respect, amongst others, of the "GUARANTY" or "DURA" Mantle, sold by the United Chemical Works.

The Welsbach Company are doing their utmost to expedite the pending actions which cannot be much longer delayed, even by the ingenuity of the defendants.

All Genuine Welsbach Mantles bear the Trade Mark "AUR."

THE

Welsbach Incandescent Gas Light Co., Ltd.,

York Street and Palmer Street, Westminster, London, S.W.

GANDY'S BELTING

THE

Gandy Belt Manfg. Co. (1901), Ld.

Works: SEACOMBE, CHESHIRE.

BRANCHES:—

LONDON, NEWCASTLE, MANCHESTER, BRISTOL, GLASGOW, BIRMINGHAM, BRADFORD, BELFAST.

Registered Trade Mark.

THE ORIGINAL.

Don't be Misled!

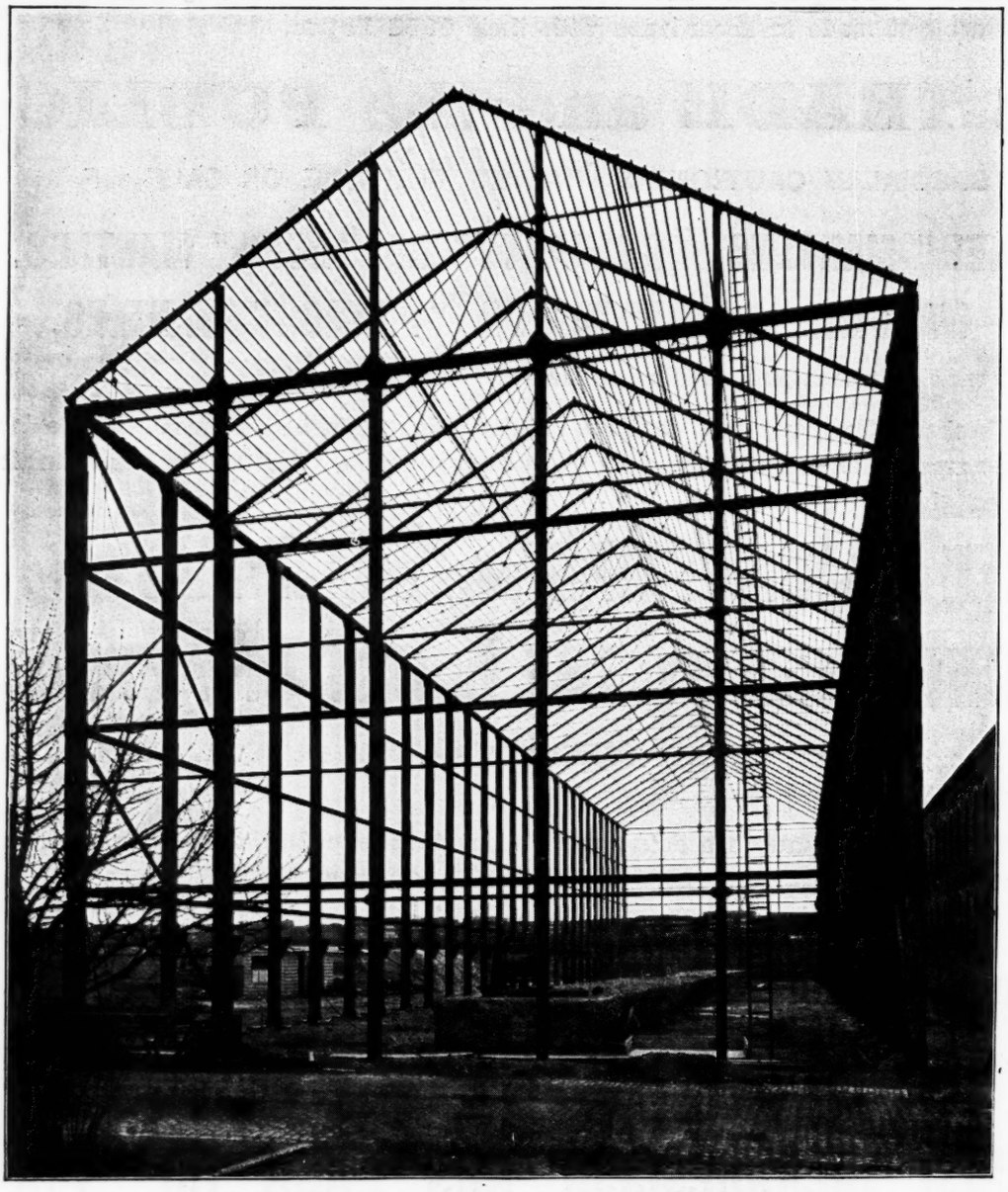
40 Awards!!

The World's Record!!!

LOOK FOR TRADE MARK.

WE MAKE A SPECIALITY OF ENDLESS BELTS FOR BLOWERS.

S. CUTLER & SONS, MILLWALL, LONDON.



EVERY KIND OF PLANT FOR GAS AND WATER WORKS. ROOFS. GIRDERS. TANKS. STEEL-FRAMED BUILDINGS.

STEEL RETORT-HOUSE RECENTLY ERECTED BY MESSRS. CUTLER.

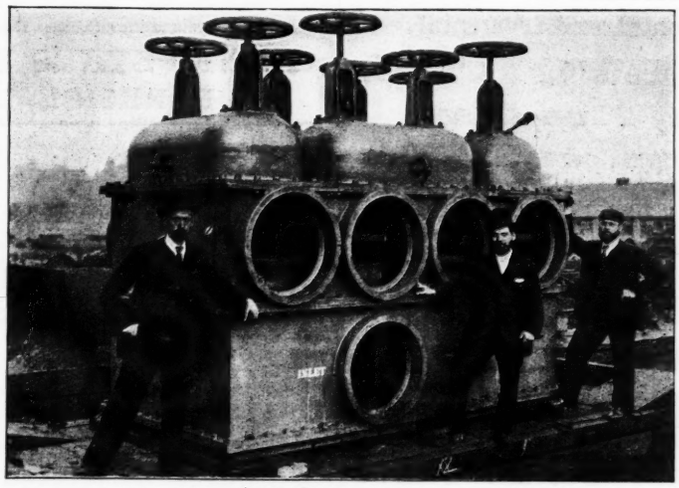
GASHOLDERS. CARBURETTED WATER-GAS PLANT. **OIL-TANKS.**

CENTRE VALVES FOR PURIFIERS.

GASHOLDERS with CABLE GUIDES or COLUMNS, &c.

COLSON'S SULPHATE of AMMONIA PLANT.

IRON and STEEL TANKS, &c., &c.



PURIFIERS, SCRUBBERS, WASHERS, CONDENSERS, VALVES of all Sizes.

24-inch CENTRE VALVE FOR 4 PURIFIERS.
(*From a Photo.*)

For every description of GAS PLANT

WRITE TO

ASHMORE, BENSON, PEASE, & CO., LTD.,

Telegrams: "GASHOLDER." **STOCKTON-ON-TEES.**

THE CLAMOND GAS RADIATOR

The Perfection of Gas-Fires.

1. Gives the HIGHEST HEATING EFFICIENCY.
2. Ensures PERFECT COMBUSTION.
3. Does not vitiate the Atmosphere.
4. It is easy to manipulate, and has no parts to get out of order.

ORDER THE CLAMOND GAS RADIATOR.

Because

It keeps a Pure Atmosphere in your Room.

Because

It keeps your Rooms free from Dirt, Dust, and Smoke.

Because

It is Cheaper than a Coal Fire.

Because

It makes a Bright, Cheerful Fire.

Because

It saves Labour, Money, and Health.

ILLUSTRATED CATALOGUE POST FREE ON APPLICATION TO

THE KERN BURNER COMPANY, LIMITED, GRAVEL LANE, SOUTHWARK STREET, **LONDON, S.E.**

HARPER & MOORES, Limited,
STOURBRIDGE.

MANUFACTURERS OF

Inclined, Horizontal, and Segmental

GAS-RETORTS,

Fire-Bricks, Fire-Clay, Lumps, and Tiles

OF EVERY DESCRIPTION.

ESTABLISHED 1836.

Telegraphic Address: "MOORES, LYE." Telephone No. 23 Lye.

THE WELL-KNOWN . . .

"SWANBRAND"

NITRATE OF THORIUM, CERIUM, AND OTHER SALTS

FOR MAKERS OF

INCANDESCENT MANTLES.

All Materials guaranteed first class.

Dr. O. KNOEFLER & Co., Ploetzensee-Berlin.

Sole Agents for United Kingdom:

J. NORRENBERG & CO.,

Cannon Street Buildings, 139, Cannon St., London, E.C.

THE LONDON MICA COMPANY, LD.

125, THE GROVE, STRATFORD, LONDON, E.

Manufacturers and Importers of all Goods connected with the Incandescent Gas Lighting.

ILLUSTRATED LIST ON APPLICATION.

A SPECIALITY—Incandescent Mantles, Brilliant White Light, Durable, at 36s. per gross. Cash with Order.

SPECIAL QUOTATIONS FOR LARGE QUANTITIES. SAMPLE DOZ. 3s. 3d., post free.

DO **NOT** be intimidated by our Rivals, and take no notice of their threats; if you are attacked, communicate with us.

Order early, and your order will be executed in time.

MICA CHIMNEYS, SMOKE CONSUMERS' MICA SHEETS, &c. of every description.

IMPORTANT TO GAS COMPANIES & CORPORATIONS.

The Latest Novelty

THE "BONBEC"

CHIMNEYLESS BURNER

ONE SIZE ONLY.

Will take all ordinary **Rods, Mantles,** and **Globes.** Being fitted with the **Perfect Regulator,** it automatically adapts itself to all **Pressures** and **Qualities** of **Gas,** and acts also as a Bye-Pass.

ECONOMICAL. BRILLIANT.

TRADE PRICE 2/6 EACH.

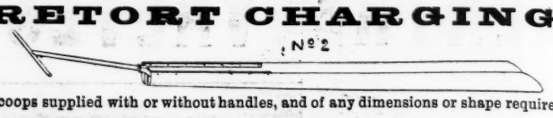
REGISTERED No. 374,019.

WHOLESALE FITTINGS CO.,

80, Commercial Rd., London, E.

Importers of Incandescent Gas Accessories and Glass Ware.

STEEL SCOOPS
FOR
RETORT CHARGING.



Scoops supplied with or without handles, and of any dimensions or shape required.

HENRY SYKES, Ltd., Engineers,

66, BANKSIDE, LONDON, S.E.

Buy your **INCANDESCENT BURNERS AND FITTINGS** straight from the Manufacturers. No matter what your requirements, write us, and we will forward, per return, our new Illustrated Price List containing quotations which must interest you. Below we give a few prices, for purposes of comparison with those of other houses. **Incandescent Burners,** Welsbach Pattern, from **4/6** per doz. **Special Offer:** Five gross lots, packing free, **£12**—*i.e.* 4/- doz. **Unbreakable Mica Chimneys** from **2/6** doz. **Best Magnesia Forks,** latest improvements, **10/-** per 1000. **Special Offer,** case containing 5000, **40/-,** packing free. **Combination Globes, 6/6** per doz. **Best Fireproof Chimneys,** specially annealed like Jena, **1/2** per doz. **Special Offer,** case of 50 doz. **£2/10,** packing free. **Mantleless Burners, 9/-** per doz.

ALL OTHER GOODS IN STOCK.

Special Prices for Quantities.

New Illustrated Price List Free on Application.

The New Export Incandescent Ltg. Co., Ltd., 36, MANSELL STREET, LONDON, E.C.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

[See Illustrated Advertisement, Dec. 3, p. 1489.]

JOSEPH CLIFF & SONS,

INCORPORATED IN

THE LEEDS FIRE-CLAY COMPANY, Ltd.

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:

16, Lightbody Street.

LEEDS:

Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

INCANDESCENT GAS LIGHTING.

Season 1901-1902.

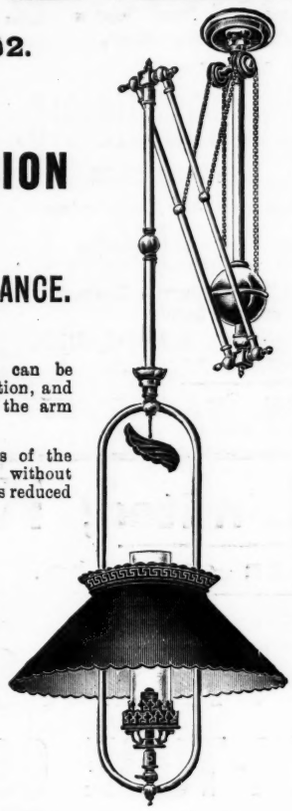
NEW PATENT

GAS SUSPENSION

WITH

PARALLEL MOTION AND BALANCE.

(COWAN'S PATENT.)



These Patent Gas Suspensions can be readily adjusted to any desired position, and can be turned to the right or left, the arm having a radius of 17 inches.

They possess all the advantages of the well-known water-slide principle, without the aid of a water-seal. Vibration is reduced to a minimum.

MANUFACTURERS OF

Cowan's Patent Incandescent "ARC" Lamps and Hinged Globe Entrance Lamps with Enamelled Cases, and "ARC" Lamps with Copper Cases. Also Cowan's Patent High-Power Gas-Lamps.

New Illustrated Catalogue on application.

GUEST & CHRIMES, Foundry & General Brass Works, ROTHERHAM.

BOWENS' Ltd. Successors, STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

ESTABLISHED 1860.

MAKERS OF · CLAYTON, SON & Co LTD · LEEDS · ALL KINDS GAS PLANT

55

IS THE NO. OF OUR STAND AT THE

GAS EXHIBITION.

MAKERS OF THE LARGEST GASHOLDER IN THE WORLD

HIGH CLASS BOILERS &c · ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.

Telegraphic Addresses: "GAS, LEEDS." "ECLAIRAGE, LONDON."

R. & J. DEMPSTER, LTD., GAS PLANT WORKS, OLDHAM ROAD, MANCHESTER.

Telegraphic Address: "SCRUBBER, MANCHESTER." National Telephone: Nos. 54 and 2296.

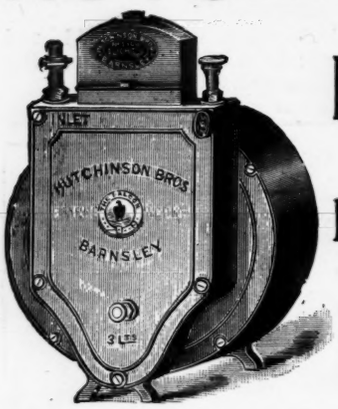
Purifier-Shed, with Ground and Overhead Lime and Oxide Floors, and containing Two Purifiers 72 ft. long by 36 ft. wide, and One Purifier 36 ft. square, on Green's System, without water lutes, erected by us for the Hartlepool Gas and Water Company to designs, and under the Superintendence, of THOS. BOWER, Esq., M.Inst.C.E.

London Office: 165, Gresham House, Old Broad St., E.C.

HUTCHINSON BROS. & CO. LD.

GAS ENGINEERS, &c.,

MANUFACTURERS OF



Improved Wet & Dry Gas-Meters.

STATION-METERS. LAMP-METERS.

Test Gasholders and General Gas Apparatus.

Brass Main & Lamp Taps. Unions, Ferrules, &c.

The "Falcon" Lamplighter's Torch. Service Cleansers.

SYPHON AND OTHER PUMPS.

WOOD AND WROUGHT-IRON PURIFIER-GRIDS. SCRUBBER BOARDS.

WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

CLAPHAM BROS., Limited, KEIGHLEY.

ESTABLISHED OVER 60 YEARS.

Sole Makers of—

Laycock & Clapham's Patent **"ECLIPSE" WASHER-SCRUBBER.**

Clapham's Patent **"ECLIPSE" WATER-TUBE CONDENSER.**

Clapham's New Century Cover for Dry-Lute Purifiers, with Patent

"ECLIPSE" JOINT & HOLDING DOWN APPARATUS.

Makers of all Iron-Work—

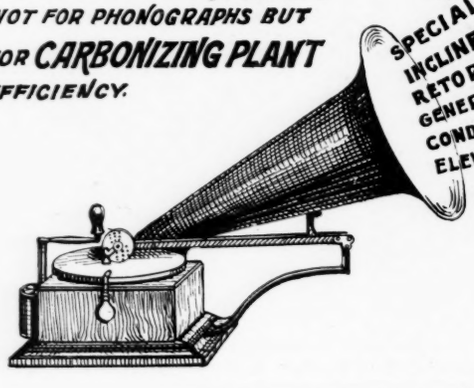
FOR CARBONIZING PLANTS. FOR INCLINED OR HORIZONTAL SYSTEM.

VALVES, MAINS, LAMP COLUMNS, TANKS, &c.

London Representatives, Messrs. JONES & YOUNGER, Chesterfield House, 98, Great Tower Street, London, E.C.

TELEPHONE No. 43, HALIFAX EXCHANGE.
TELEGRAMS: "DRAKESON HALIFAX".

WE HOLD THE BEST RECORDS
NOT FOR PHONOGRAPHS BUT
FOR CARBONIZING PLANT
EFFICIENCY.



JONAS DRAKE & SON
SPECIALISTS IN CARBONIZING PLANT.
INCLINED RETORT INSTALLATIONS COMPLETE.
RETORT BENCHES COMPLETE, WITH
GENERATOR & REGENERATOR FURNACES.
CONDENSERS, SCRUBBERS, & PURIFIERS.
ELEVATORS & CONVEYORS FOR COAL & COKE.
OVENDEN-HALIFAX.

& AT 34, VICTORIA ST.,
LONDON, S.W.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Olding, Ltd., 12, Gough Square), and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Dec. 17, 1901.